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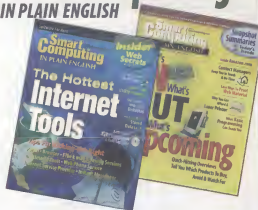
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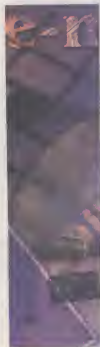
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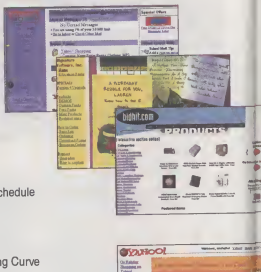
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What's Hot, What's Not & What's Next

If you haven't been caught up in the computing whirlwind yet, just wait. Despite the claims of the end of the PC era, the decline of Moore's Law, and "bloated" software, there's no sign that manufacturers and distributors are letting up. So far, there's only been a slight shift in the way some companies do business and more features, functions, and technologies for the consumer to decipher. And the Internet? Well, there's definitely no sign of a letdown there.

Which brings us to this issue. Whether you're actively searching for new hardware or software, browsing the Web, or trying to catch up with all of the latest computing trends, you'll find the answers you need right here. We've identified 50 of the hottest Internet and computing realms, waded through what's available in each category, and compiled quick tips and advice for your perusal. Our at-a-glance summaries are sure to help you get up to speed on what's happening in the marketplace.

Use these articles as a starting point before you head to the store. Use them as a manual for your Internet explorations. Or just use them as your quick resource for brushing up on all of today's and tomorrow's computing trends. Soon you'll be your own expert, sharing advice on what's hot, what's not, and what's next in computing.

Operating Systems

Microsoft Plans To Offer Significant Enhancements & Linux Continues To Attract Users

If you take a snapshot of today's consumer operating system (OS) market, Microsoft dominates the picture. Windows 95 and Windows 3.x have become old friends to many, and Windows 98 Second Edition now represents the status quo for today's consumer OSes. A closer examination of the snapshot also reveals a growing handful of alternative (or rebel) OSes bravely peaking through Window's curtains. An increasing number of value-conscious, trend-bucking consumers are using these OSes. And, at the edges of the picture are the newcomers to the scene, such as Windows Millennium, which will soon debut as Microsoft's new OS for the consumer market.

Think of this article as a magnification of the OS snapshot. Through the magnifying glass, you can pick out OS features that are particularly hot, the ones that are no longer sizzling, and others that are emerging.

■ **What's Hot.** The OS market, as illustrated by the categories below, has changed more as of late than in the recent past.

Internet integration. The Internet is hot—period. You can access it no matter which OS you choose, but because of its increasing popularity, a particularly hot OS feature is Internet integration. Microsoft provides an excellent example of this integration by literally building its Internet Explorer 5.x Web browser into Win98.

What's more, this integration allows you to access the Web from anywhere within Windows, as well as access any file or program on your computer from your browser's Address bar while Web surfing. Among other



things, Internet integration enables you to embed hot links into documents or e-mail messages and find Web addresses by going to your Start menu and selecting Find, On The Internet. You can browse your computer just as you would surf the Web, using Back and Forward buttons and saving Web pages as well as non-Web files in your browser's Favorites menu. You may even download Active Desktop items such as stock tickers or news headlines.

Win98 also makes it easy for you to set up and configure home or small office networks in order to share a single connection to the Internet. The OS comes with built-in software that, when used in conjunction with a home network kit, allows you to easily create a mini-network of PCs. By linking one or more older machines to a computer equipped with Win98 SE, all co-workers or family members can share a high-speed modem, saving you from having to update all your computers or

purchase separate phone lines for each. It also enables the sharing of other peripherals, such as printers or scanners.

Multimedia support. As long as games, movies, music, and the Internet remain popular as uses of home computers, increased multimedia capabilities, such as those exhibited in Win98, will also stay hot. Particularly sought after in today's OSes is support for WebTV (using a TV tuner card, you can watch traditional TV on your computer) and digital versatile discs (DVDs; massive memory discs that look like CDs, but are large enough to hold full-length feature movies that can be viewed on your computer). In addition, many users seek DirectX application program interfaces (APIs, sub-programs that help Windows communicate with programs to enhance its multimedia capabilities).

Easy maintenance. Win98 incorporates several hot features designed to simplify the maintenance of your machine. The Maintenance Wizard helps you set up a routine of automatic tune-up procedures while 15 different troubleshooting wizards stand ready to help you find solutions when problems occur. Windows Update represents another hot feature, connecting you to a Web site that analyzes your computer and suggests downloadable updates that your system could use.

When it comes to adding hardware, "hot" has now gone beyond support for the original Plug-and-Play standard (which simplifies the process of adding peripherals by eliminating the need for manual configuration) to support for even slicker functionality, such as that provided by Universal

What's HOT

- Internet integration
- Support for multimedia and networking
- Easy maintenance and helpful wizards
- Microsoft alternatives (such as Linux)

What's NOT

- Text-based interfaces
- Manual hardware configuration
- Manual maintenance
- Lengthy self-help searches

What's NEXT

- Better stability and networking features
- Advanced hardware support
- Enhanced multimedia features
- More Microsoft alternatives, more Linux

Serial Bus (USB) ports. USB makes hardware installation even easier by allowing you to plug one accessory into another and enabling you to install an accessory without having to reboot.

Then there's the standard known as the Institute of Electrical and Electronics Engineers (IEEE) 1394, which offers high-speed data transmission between computers and electronic products. Advanced Configuration and Power Interface (ACPI) is another hot technology supported by Win98. It's a power management tool that conveniently tells your OS and peripherals when to shut down and start up in order to conserve the most energy.

Microsoft alternatives. If you've begun to think that an OS isn't hot or can't offer a hot feature unless it bears the Microsoft label, think again. Undoubtedly, Windows is widely used and offers an extensive range of desirable features, but it is by no means alone. And, in the opinion of many today, "hot" is anything but Microsoft.

That's why your snapshot of today's consumer OS market will contain glimpses of other products. These OSes include Linux (a derivative of the network OS UNIX; <http://www.linux.org> or <http://linux.com>), OS/2 (IBM's OS; <http://www-4.ibm.com/software/os/warp>), BeOS (an OS from Be Inc. that specializes in handling heavy data loads; <http://www.be.com>), and the Mac OS from Apple (<http://www.apple.com>).

Linux is free and open. Two hot features make Linux the most popular of the Microsoft alternatives: it's free, or at least extremely cheap to install and upgrade, and its open source code allows knowledgeable users to tweak it to meet their own specific needs or tastes. Besides all that, Linux is known as an extremely stable environment.

When Linus Torvalds first wrote the code for Linux, he developed it under the GNU General Public License with the stipulation that the code would always be open and that it would never be sold for profit. Because of the open source code policy, many companies have since perfected changes to the software and now distribute their own slightly different versions of it.



Linux (the Red Hat version)

Red Hat Linux (<http://www.redhat.com>) is one of the best-known packages on the market right now. You can visit either <http://www.linux.org/dist/ftp.html> or <http://www.linux.com/getlinux> to find lists of other distributors and learn more about any documentation, technical support, or applications that might be included in their Linux packages.

The downside of Linux, for those who prefer the graphical user interface (GUI) of Windows, is that its natural look is very much "command line." But downloading and installing a desktop such as GNU Network Object Model Environment (GNOME; <http://www.gnome.org>)

or the K Desktop Environment (KDE; <http://www.kde.org>) solves that problem, allowing users to customize their system's look and functions.

■ **What's Not.** Think back to the days of Windows 3.x. They weren't that long ago—relatively speaking, that is—but in the technology world, those years might as well have been decades. The new features you remember as "hot" even 5 years ago are now considered "dated."

Text-based interfaces. OSes that run on text-based, command-line operation rather than a GUI Desktop with point-and-click icons and windows are obviously not hot any longer. Even text-based OSes like Linux have had graphical interfaces created for them. If you have to type `dir` to view the contents of a directory or if you have to type the name of a program in order to run it, you're probably using an OS with a text-based interface, which is not a hot feature.

Manual hardware configuration. If connecting a printer to your computer involves manually configuring it within each separate application and painstakingly loading drivers from diskettes, you should know that there's now an easier way to accomplish this task.

OSes such as Win95 or Win98 interface with all the applications for you so that you only have to configure the peripheral once; and most of the time, these OSes have built-in drivers so that you don't have to feed diskettes to

your PC. Furthermore, OSes that support plug-and-play functionality and other newer peripheral interfaces (such as USB) classify as hot in today's computing world. On the other hand, OSes that *only* support the slower generation of hardware connections through serial ports, parallel ports, or PS/2 ports are out—totally out.

Manual maintenance. Heaven forbid that today's average consumers should have to manually perform basic disk maintenance tasks such as defragmenting, cleaning their hard drive, or running ScanDisk. It's not hot if you have to conscientiously remember to set aside time to perform these necessary maintenance tasks. That's why OSes such as Win98 make system upkeep easy using the Disk Cleanup Wizard, a feature that automatically deletes unnecessary files, and the Maintenance Wizard, which helps you set up automatic basic disk maintenance.

Lengthy self-help searches. OSes that leave you relatively high and dry when disasters strike have also declined in popularity, especially with the typical home user. In previous years, users had few options but to scour tedious users manuals or call technical support.

Today's OSes (such as Win98) have a new front line of defense in the form of online help information, which users can retrieve by searching an Index or looking through a Table of Contents. It doesn't take long to find what you're looking for, and when you do, you'll see easy-to-follow, step-by-step directions. If this assistance isn't enough, a plethora of troubleshooting wizards are always ready to help you diagnose and solve technical problems.

■ **What's Next.** The two big newcomers on the immediate OS horizon are Windows 2000 (Win2000) and Windows Millennium. Win2000, though some consumers may use it, is targeted as a business/networking OS, similar to its predecessor, Windows NT 4.0 (WinNT4). If you have a computer at your office, chances are it will run Win2000 sometime in the future.

We won't dwell on Win2000 too much since it's not really a consumer product, but we will say that in its creation, Microsoft plans to combine some of Win98's strengths (such as Plug-and-Play hardware support, USB support, and increased browser integration) with WinNT4's stability and networking capabilities. It's definitely an OS we'll be

seeing more of in the near future. (Its release is scheduled for February of 2000.)

Windows Millennium, following Win98, is slated as Microsoft's next consumer OS. Although its release date is not yet finalized, we'll share what we do know about Millennium and its new features to provide you with a glimpse of what's next for OSes.

Better stability. Stability is always a goal for any OS, so one of Millennium's hot "next" features will be system file protection (SFP) technology. SFP monitors your system, searching for possible problems and solving them before they have a chance to crash your computer and disrupt your productivity. It also prevents you from accidentally deleting critical system files. If you try to erase such a file, it automatically restores it before disaster strikes. Along with SFP is the new System Restore tool that lets you turn back the clock after a serious problem, returning your system Registry to a time when it worked properly.

Advanced hardware support. With the next computing wave lie a plethora of new hardware components using a wide range of new technologies and standards. The consumer OSes of the future must be prepared to handle these technologies when they become available, so that's why Windows Millennium will come with built-in support for an unprecedented number of hardware components. USB, IEEE 1394, and ACPI are a few of the standards Millennium promises to support. Win98 already offers several of these standards, but Millennium will go even further by helping future users transition from the outdated peripheral interfaces (such as serial ports and parallel ports) to the new ones.

Increased networking. One of Win98's hot features is its ability to network, allowing users to share computers and peripherals. One of Millennium's features—a feature that's just around the corner—is the ability to network your computer with non-computer, consumer electronic devices. In the not-too-distant future, you'll be able to control

Terms To Know

Advanced Configuration and Power Interface (ACPI)—A power-management, energy-conservation feature that enables the operating system to control the amount of power used by each peripheral. ACPI also tells the operating system when to shut down and when to activate itself.

graphical user interface (GUI)—An operating system interface that uses windows, icons, and point-and-click menus for navigation rather than requiring text-based command lines.

Institute of Electrical and Electronics Engineers (IEEE) 1394—A networking standard which enables the transmission of bandwidth-consuming data between computers and electronic products, such as video, digital camcorders, and VCRs.

Universal Plug-and-Play (UPnP)—A type of network that uses Web-based protocols, such as Internet Protocol (IP) and Hypertext Transfer Protocol (HTTP) to connect non-computer, consumer electronics

products. The connected devices communicate with one another via phone line, Ethernet, IEEE 1394, wireless, and other network connections.

Universal Serial Bus (USB)—USB is a hardware interface standard that gives peripherals faster connections, allows users to plug one accessory into another, eliminates the need for separate power cords for each device, and enables users to install devices without having to reboot.

your home security system with Windows Millennium, thanks to its built-in support for Universal Plug and Play (UPnP), a type of network that uses Web-based protocols and enables connected devices to communicate with one another via phone line, Ethernet, IEEE 1394, wireless, and other network connections. Currently, there aren't any devices you could connect using UPnP, but when they become available, Windows Millennium plans to be ready for them.

Enhanced multimedia features. The up-and-coming multimedia features that will accompany Windows Millennium are especially for gamers and amateur photographers. For gamers, the new Application Manager feature promises to rid your hard drive of files from games you haven't played recently. And if you run out of space, Application Manager-ready games can search your hard drive for older games that it can remove. The new game then automatically removes non-essential files with no help from you. Additionally, a Direct Input Mapper detects

controllers as soon as you install them and automatically sets them up to work with any new games you might load.

For digital camera photography buffs, a new interface called Windows Image Acquisition will be included, as well. This interface lets you see images on a scanner or camera without intermediary software. All you have to do is plug in the camera, and your pictures are ready to view. Plus, if you have a compliant camera, you can even preview your images on the camera before you spend time downloading them.

More alternatives, more Linux. Alternative OSes, meaning those that are not from Microsoft, are already gaining a surprisingly large following, and we believe that trend will continue into the future. For example, even though Linux is available to download free, various Linux software packages totaled nearly 15% of retail OS sales in the first half of 1999. In addition, during its 8-year life span, Linux has attracted more than 15 million users in a Microsoft-dominated world. If Linux usage continues to grow as it has in the recent past, it should definitely rate as a formidable "next" in this ever-evolving world of operating systems. **[E]**

by Hannah Henry



Microsoft Windows 2000 Professional

Office Suites

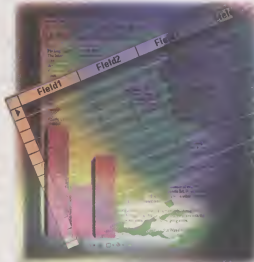
Internet Integration & Voice Recognition Make Waves

Next to the operating system and a Web browser, an office suite is arguably the most important software you can install on your PC. The productivity applications included with most office suites let you construct spreadsheets, devise databases, produce professional-quality presentations, and create practically every type of document imaginable. It's likely you spend more time using your office suite than all your other applications combined.

What's included in an office suite has changed little during the past five years. The typical office suite of today, like so many of its predecessors, consists of a word processing application, a spreadsheet, and a database. Various office suite editions also may offer presentation software, desktop publishing applications, and contact managers.

If you want to witness the effects of development trends on office suites, you have to go beneath the surface. You have to dig into the office suites—look in the File menus, discover the automated functions, experience the improved performance first-hand—to get a true measure of how far office suites have come and where they're going in their progressive evolution.

■ What's Hot. In a discussion of what's hot and what's not in computer technology, one could argue that office suites in general are hot. The computer is no longer a hobbyist's plaything or a rich person's toy. It's a real productivity device, as useful to those of us living on the cusp of the 21st century as the musket and the plow were to the pioneer. The office suite is the collection of software that lets you use your computer most productively.



A few hot development trends currently shaping the face of office suites promise to make you even more productive when you use your PC. Not surprisingly, these trends are extensions of even bigger trends affecting the entire computer industry. When it comes time for you to buy your next office suite, you want to make sure these trends are a part of the product you select.

Internet integration. The biggest trend in office suite development right now, says Penny Scharfman, marketing group manager for SmartSuite at Lotus Development Corp., is the integration of Internet capabilities into the office suite.

"What's really hot is figuring out productive and easy ways to access and leverage the Web from within office suite applications," Scharfman says. "The Web is just getting more and more important, and people that tend to use desktop applications aren't necessarily that Web-savvy. So any way we can help them get

their information to intranet sites, any way that we can help them share information with colleagues, with customers, with partners—that's hot."

An example of the Internet being integrated into the office suite is the new Web Tables feature built into the latest version of Lotus 1-2-3, which is part of Lotus SmartSuite. The Web Tables feature lets you embed an active universal resource locator (URL, Web address) within a cell on a spreadsheet. You can then configure Lotus 1-2-3 to refresh the data at regular intervals, such as every 15 minutes.

The result is a spreadsheet that provides up-to-date data, such as stock quotes or currency exchange rates, as that data changes.

Frank Tomei, brand manager of corporate WordPerfect suites for Corel Corp., says that the Internet has had another noticeable effect on the development of office suites. "The Internet has linked everyone together," he says, "and now it's a community where people are exchanging files more than ever before. Being able to exchange files has become more important, so everything we do is founded on open standards or de facto standards."

Users of Corel WordPerfect Suite 2000 can open and edit Microsoft Office documents. Likewise, Corel WordPerfect documents can be saved in a Microsoft Word file format. Lotus and Microsoft have the same support for open standards.

Of course, the phrase "open standards" usually translates as "complies with the popular Microsoft formats, such as .DOC for word processing documents and .XLS for spreadsheets." That's OK, though. The acceptance of open standards among office documents, regardless of where those standards originated, lets you use the office suite you prefer instead of the one everyone else does.

Voice recognition. Another hot trend among office suites is the inclusion of voice recognition capabilities with the rest of the office software. Lotus SmartSuite, for example,

What's HOT

- Internet integration
- Voice recognition
- Customization
- Increased productivity and performance

What's NOT

- Gimmicks
- Proprietary standards
- Lack of interactivity and connectivity

What's NEXT

- Continued Internet integration
- Continued voice recognition
- Alternative delivery methods

ships with a bundled copy of IBM ViaVoice. A version of Dragon NaturallySpeaking comes with select editions of Corel WordPerfect Office 2000. These voice-recognition applications let you communicate orally with the office suite.

"The ability not only to type into a document but actually to communicate with it by voice is very hot," Lotus' Scharfman says. "If you went back three years ago, speech recognition was a toy. You ... would ... have ... to ... speak ... slowly, and it was not a productivity tool. It was something you played with at home. With the advent of continuous dictation, you can speak at a normal pace and actually teach a computer your accent, the way you speak. With the advent of that kind of technology, people who use typical desktop applications for business can actually use [the voice recognition component] as a front end."

The obvious application of voice recognition in an office suite is the dictation of a text document. With built-in voice recognition capabilities at your disposal, you can dictate a document into your computer, review it for spelling errors, then save or print it. It's possible you could use voice-recognition features to create a document without ever touching the keyboard.

Document dictation is not the only application of voice-recognition software. You could also use voice recognition with your spreadsheet. "There's a finite vocabulary you would say to a spreadsheet," Scharfman says. "It's not just any word. It's numbers, and it's concepts, and it's column headings that you can almost predict in advance. So the spreadsheet tends to get every single thing you say right away."

Customization. It seems as if everything related to PCs is customizable. Office suites are no exception. Customizable menus and toolbars let you put the features you use most often in a prominent position in your user interface. You can also change the appearance of the interface itself, adjusting the size and appearance of the toolbar buttons, for example, to accommodate your personal preferences.

Microsoft Office 2000 is leading the way in this area. In addition to its other customization features, Microsoft Office lets you customize error and alert messages with hyperlinks to Web sites that may help you solve the particular computer problem. The Microsoft Office suite also lets you create customized folders to hold clip art and other graphics. Lotus SmartSuite and Corel WordPerfect Office are not far behind in developing this hot trend.

Productivity and performance.

Something that affects the development of any product is the demand for better performance and more efficient productivity. Users know that the average system today contains much more memory, a much faster processor, and much more storage space than the average system three years ago. As a result, users expect the newest office suites to perform faster and more powerfully than office suites of the past.

"A few years ago, having color [in a presentation] was a big deal, very impressive," says Corel's Tomei to illustrate the rise in performance expectations. "Now if you don't show up with a laptop and a customized slide show, you haven't done your homework. It has to have graphics, color, layout—all those things. It has to be fully desktop published. We need to offer our customers that capability because it's just expected in the workplace."

You can see office suite developers reacting to this trend in practically every element of their products. Word processing applications,

for example, now double as desktop publishing applications, supporting embedded graphics, charts, and illustrations. Meanwhile, desktop publishing applications and presentation software provide all-purpose publishing solutions, with tens of thousands of clip-art images, Web authoring capabilities, and support for dozens of multimedia formats.

■ **What's Not.** If productivity and improved performance is hot, it's easy to guess what isn't. Anything that impedes performance is a big turnoff when it comes to office suites. What can impede performance? Three things: gimmicks, proprietary standards, and lack of interactivity. The three biggest office suite developers have rid their products of these impediments.

Gimmicks. "The things our customers tell us to spend zero time on would be things like a talking paper clip, not to mention any names," says Lotus' Scharfman. "Things that are like toys, that are not productive, are not things that sell. Our customers tire of them, and they don't like that."

The biggest offender in this area is Microsoft, which received a great deal of criticism for adding the Office Assistant help feature to Microsoft Office 97. The Office Assistant, which took the form of an animated paper clip, was intended to provide friendly, automated assistance within Microsoft Office. Instead, users quickly became annoyed at the cutesy gimmick. The problem was that the talking paper clip appeared on-screen unexpectedly and at the most inopportune times, offering little real help. In October 1998, Microsoft announced a way for users to eliminate the Office Assistant from their computers.

Proprietary standards. Computer users don't like to be told what to do, so it's no surprise that they don't like proprietary standards. Although proprietary standards were the norm until recently, the latest versions of Microsoft Office, Lotus SmartSuite, and Corel WordPerfect Office all tout open file compatibility as a key feature.

Lack of interactivity. Gone are the days of productivity applications that don't provide access to the Internet and intranets. Today's productivity applications must include built-in Internet and network connectivity. Office suite developers that fail to interact with their customers are passé. "It's important for customers to be able to interact with the vendors and with each other," Tomei says, "so what's not hot is software that doesn't allow that."



Corel's WordPerfect Office 2000



Lotus SmartSuite



Corel's OfficeCommunity.com (<http://www.officecommunity.com>) lets users meet to discuss Corel's office suite products.

What's Next. The future of office suites is bright, that's for certain. What's uncertain is how office suites will continue to evolve under the influence of today's hot trends. And we wonder just how important alternative delivery methods will be.

Continued Internet integration. Office suite developers continue to look for ways to integrate Internet functionality into their future products. One potential area of Internet-related development has to do with electronic commerce.

"E-commerce is such a hot trend," Lotus' Scharfman says, "that I think for desktop applications to be able to participate in creating content for an e-commerce world is going to continue to be very important." Toward that end, you may eventually see an office suite database that can be published online as a catalog for online shopping. Or you may see office suites that sport a transactional component in addition to its word processing application and spreadsheet.

Another potentially hot Internet-related trend for office suites is an increase in the interaction between the office suite developer and the client. Office suite developers are currently plotting ways they can use the Internet to build strong relationships with their customers. In fact, Corel Corp. has already developed a Web site (<http://www.officecommunity.com>) especially for interacting with its customers. The company also plans to build a smart agent into its future office suites. This agent will monitor office suite applications for trouble areas and automatically preempt potential problems as they're discovered. Look for Lotus and Microsoft to follow Corel's lead in this area.

Continued voice recognition. Voice recognition has been around for several years,

and two out of the three major office suites currently bundle voice recognition software with some versions of their products.

This is a promising sign, but it doesn't mean that voice recognition has reached the point where it's an acceptable method of data input. Users must become comfortable with voice-recognition technology. That should happen in the next few years. Then voice recognition will be hot.

Alternative delivery methods. Changes in the way productivity applications are delivered to the PC could have the biggest

effect on the future of office suites, says Sheldon Speers, business development manager for Corel WordPerfect suites. The most favored of these alternative delivery methods involves an **application service provider (ASP)**. An ASP is a company that distributes software applications to paying clients via the Internet.

The benefits of using an ASP are obvious. The clients can get and use needed software for significantly less than the price of buying and installing it themselves. Because the software actually resides on the ASP's servers, the clients don't need to spend the time and effort upgrading and maintaining their systems to support the software. The clients can access the software from anywhere as long as they have access to the Internet.

"What we're seeing is new delivery trends using the Internet that allow customers to get maximum value for their investment in product," Speers says. "What you see is software actually being delivered over the Internet as part of a complete solution, so you're no longer tied to buying megadollars worth of hardware to run the application. You can actually outsource that through a third-party company; make use of your core expertise, which is the application itself; and leave all the extraneous stuff to a third-party company."

Corel and Microsoft have already introduced ASP delivery of some products, but it will be awhile before this becomes a hot trend. Preventing the widespread acceptance of ASPs at the present are current bandwidth limitations and the sheer novelty of ASPs, not to mention the fact that ASP delivery is in its early stages when unforeseen problems are most likely to arise. Give this trend some time, however, and

we're sure ASPs will become an accepted form of product delivery.

What's Now. For now, office suite users should take the time to familiarize themselves with the hundreds of built-in functions and features that can potentially improve their productivity. Once they've caught up with what's hot today, they'll be ready to take on the hot trends of tomorrow. **LS**

by Jeff Dodd

Terms To Know

application service provider (ASP)—a third-party company or organization that distributes software on an as-needed basis to paying subscribers for a limited period of time. For example, a business could rent an office suite from an ASP rather than buy the suite.

e-commerce—Internet-based commercial activity, particularly the buying and selling of goods on the World Wide Web.

embedded—Intentionally inserted into a document or file.

hyperlink—An object in a document that, when clicked, automatically opens another targeted document in the viewing field.

Hypertext Markup Language (HTML)—A popular formatting language used to design most documents found on the World Wide Web

smart agent—A program that performs a single automated function, usually on the Internet. For example, a sports-related Web site may employ a smart agent to search the Internet for the latest sports news and scores. When the agent finds sports-related data, it transfers the information to the Web site, where it's posted automatically.

universal resource locator (URL)—An Internet address. For example, <http://www.smartcomputing.com> is the URL for the Smart Computing Web site.

Finance Software

Rapid Changes Result In Easier Ways To Manage Your Money

Fast and furious changes have become the rule in the world of personal finance. Five years ago, you did nearly all of your banking face-to-face. Now you can do most of your banking face-to-computer screen. Until a few years ago, finding investing information through any method other than your local broker, let alone making a trade, was virtually impossible. Now you can manage your own portfolio with as much or more information than your broker ever had.

The new methods for managing your personal finances have been at the core of changes occurring in personal finance software. New versions of Intuit's Quicken and Microsoft Money have been released on an annual basis to keep up with the changing personal finance environment. We'll discuss the changes, giving you an idea of which changes will benefit you the most.

■ **What's Hot.** If "the Web" was the first thought you had when considering changes occurring in finance software, give yourself a gold star. Few types of software are taking advantage of the Web like personal finance software.

"This is not going to be a surprise, but there's really nothing hotter than the Internet," says Joanna Fuller, product manager for Money.

Through Quicken or Money, you can download an almost limitless amount of information, such as investment quotes, historical investment prices, investment news, account transactions, loan information, and specific financial news. The software then uses the downloaded, up-to-date information to



enhance its other features, such as financial planning and research.

In addition to downloading data into Quicken and Money, users are now uploading data to the Web much more frequently. Paying bills online continues to grow in popularity, although some people are paying bills through their bank's Web site, skipping the feature in Quicken or Money.

Other features in Quicken and Money let users upload their bill payment calendars and investment portfolios to secure Web servers, where they later can access them through any computer with a Web connection. Quicken already offers a "lite" version that can be used with handheld computers; Money will offer a version designed for handhelds early in 2000.

"A lot of it is the anywhere, anytime access that we've already been supporting, where you can put your portfolio on the Web if you choose to," says Theresa McGinness, product

manager for Quicken. "We know that users are at different levels of comfort with doing that right now, but we do provide that access. You can enter your banking transactions on the Web. You can have your data on your Palm Pilot, so when you're away from your Quicken desktop, you can have that access. . . . You can keep up to date with your finances and enter your transactions, even when you're away from home."

The ability to track your finances almost instantly from almost anywhere has given users a powerful tool for taking care of their basic, day-to-day financial needs. The up-to-date information available through the Web has given users a powerful tool for creating useful, accurate financial plans.

Both McGinness and Fuller say users of their products are especially interested in financial planning. (The Deluxe versions of Quicken and Money offer financial planning features not found in the Basic versions.) For instance, the demands of Quicken users for improved planning features led Intuit to incorporate the features found in its Quicken Financial Planner software with Quicken a couple of years ago.

Users can create financial plans that will help them save for retirement, find loans, decide whether they can afford a vacation, and determine the affect of taxes and inflation on investments, among other items. Users can see how current events in their financial lives will affect their future plans and determine whether they're on track to meet a future financial goal, whether that goal is to pay for their daughter's college tuition in 12 years or to take her to Disney World next summer.

"You don't have to sit down with all of your [formulas] in front of you on a piece of paper," Fuller says. "You actually can input the things that you know you want to accomplish financially, and the program will do the work for you."

Best of all, the financial plans have been designed to be easy to set up and use. The

What's HOT

- Investment research
- Online bill paying
- Financial planning
- Access from anywhere

What's NOT

- Printing checks
- Manual data entry
- Annual upgrades

What's NEXT

- Seamless Web integration
- Data sharing
- Smart software
- Data filtering

software will walk you through the process of entering the necessary data to use in planning.

"When I show this product to people who've never used personal finance software, but are thinking about using it, all I have to do is go through the Money setup assistant, and people's eyes light up and they say, 'This is the year that I'm going to use personal finance software,'" Fuller says.

■ What's Not. As Quicken and Money's software engineers are scrambling to enhance their Web-related features and take advantage of everything the Web has to offer, the ability to handle transactions electronically has rendered a few aspects of the programs less useful.

For instance, a few years ago many Quicken users printed their checks, using specially created blank check forms that could be fairly expensive. Aligning the forms just right in a printer was sometimes a hassle. Even with those drawbacks, though, many users chose to print checks because it took less time than typing data into Quicken and then writing the checks by hand. The ability to make bill payments for a small fee through the Web, however, seems to be making check printing an obsolete feature.

Performing all data entry manually is another area that Quicken and Money seem to have outgrown. By using the Web in conjunction with a participating financial institution, users can download all of their transactions into the financial software, making data entry obsolete. Users also no longer need to manually enter security prices in their portfolios; Quicken and Money can automatically download the prices.

Even though using the Web can take a lot of the drudgery out of using financial software, some users still prefer to print checks

As the amount of information on the **Web** grows,
you can expect **financial software**
to help you filter the information.

and perform data entry by hand, McGinness and Fuller say, especially if they are veteran users of the software. Because some users prefer to continue using such features, Quicken and Money will continue to offer them as options.

"Our philosophy is to make sure we have the options for where our customers are on the adoption curve," McGinness says. "We're not going to be taking away some of the features; we know some people are not comfortable with the electronic features."

If you'd rather take advantage of the Web-related features built into Quicken and Money, an upgrade is a necessity. The 1999 and 2000 versions of Quicken and Money are light years ahead of the versions released in 1998 and earlier, especially when it comes to efficiently using the Web.

But whether you'll need to continue upgrading on an annual basis remains unknown. Microsoft and Intuit have been following a product release schedule that calls for annual upgrades, and Fuller and McGinness say that schedule will continue in the near future. It's hard to imagine, though, that either product is

going to offer major improvements in the next few years; certainly nothing on the scale that was seen when upgrading from the 1998 to the 1999 and 2000 versions.

■ What's Next. While Intuit and Microsoft refuse to discuss specific features they plan to include in future versions of Quicken and Money, users can expect to see enhancements on the features currently built in to the software, especially when it comes to using the Web.

"We will continue to allow consumers to do more and more remotely and do more and more through the Internet, if they choose, and to really automate the day-to-day tasks that they do, whether that means paying bills or checking on their account activity," Fuller says. "I think we're going to find more powerful ways to use the Internet."

In fact, most of the future trends for improvements to the features found in financial software involve the Web in one way or another. Users should find themselves using the Web more seamlessly with financial software in future years, almost reaching the point where users may not know whether a particular piece of data is on the Web or built in to the program. Downloading of data could occur in the background or could occur continuously without interrupting your work.

Both Quicken and Money should offer better methods for using the up-to-date data as well. The software could download interest rates and apply those rates to your current financial situation, based on personal data you had entered earlier. The software then could suggest whether you're a candidate for refinancing of a loan, based on the new rates and then steer you toward the research information you need on the Web.

As the amount of information on the Web grows, you can expect financial software to help you filter the information, leaving you only with the data that is most relevant to your financial situation. As your financial situation changes, the software will change its filters to meet your new needs.

Users will also be able to customize the program to meet their personal needs in areas



Quicken TurboTax Deluxe



Quicken 2000 Deluxe

other than the Web. Users will be able to choose to display certain information or to fully personalize the data.

Quicken and Money already incorporate most of these trends in varying capacities, but you can expect both programs to increase their ability to tailor themselves to your personal needs when it comes to using the Web and the information available on the Web.

Not only will financial software pull relevant data from the Web, but it will also share data with related software. After all, the planning features found in financial software are only as good as the data with which they have to work.

For example, Quicken 2000 and Intuit's income tax preparation software, TurboTax

1999, now share data. In past years, Quicken users could download their financial data into TurboTax, which saved some data entry

and made for more accurate tax calculations. Now TurboTax can pass some of its data back to Quicken, giving Quicken's financial planning tools more accurate data for tax projections and allowing the tools to determine the affect taxes will have on several areas of your finances, including investments.

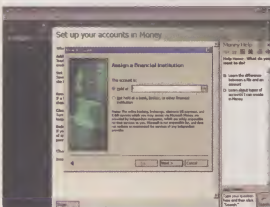
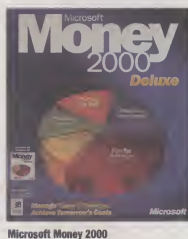
"That's really powerful for the user, the idea of 'enter once, use many times' with data throughout the Intuit product line," McGinness says.

Ultimately, all of these product enhancements will be designed to do one thing: Save users time. By downloading relevant data, Quicken and Money won't need to wait for mind-numbing data entry to begin providing advice or developing financial plans. Users will immediately be able to put the data to use and spend more time determining how to make the most of their finances and spend less time typing.

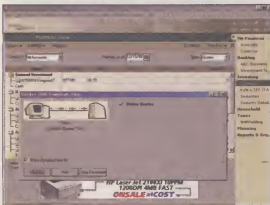
"We just want to make it faster and easier for customers," McGinness says. "Then they can do what's really important, assessing their situation and actually doing something about it, rather than spending time manually entering data. This is where the technology really helps the user."

As different features are enhanced and as personal finance software evolves to take advantage of opportunities on the Web, users can still bank on the software continuing to serve their No. 1 need: Determining where their money goes. By using the latest versions Quicken and Money, though, you'll be able to see where your money is going with much less hassle, and you'll have more time to do something about it. **[S]**

by Kyle Schurman



Microsoft Money's step-by-step instructions for procedures such as setting up accounts make the software easy to use.



Quicken lets you connect to the Internet and download information with one click.

Terms To Know

asset allocation—The use of investment classes in a portfolio, designed to provide balance as a hedge against investment risk.

bill reminder—A feature of financial software that reminds you about upcoming bills.

category—A designation of the type of transaction, such as housing or grocery, that's used for budgeting purposes.

check register—The screen on which you type or download individual transactions.

deluxe—A version of financial software that contains more features, especially planning features, than a basic version.

graph—A visual representation of a certain aspect of your finances; it's usually displayed as a pie or bar chart.

home page—The opening screen on which your financial information is displayed; the information displayed is customized.

investment research—Data about stocks, bonds, and mutual funds that's made available through the Web.

online banking—Any aspect of banking you can perform through the Internet, such as bill payment or fund transfer.

planning—An aspect of financial software in which your data is analyzed to determine your future situation.

portfolio—Your overall investment account balances and holdings.

reconcile—The process of balancing your bank statements in financial software.

wizard—Step-by-step instructions in financial software designed to help you set up or use a particular feature.

"I love the sound of
a stock splitting
in the
morning."



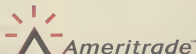
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Word Processors

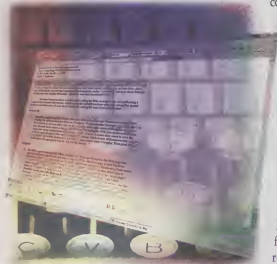
Voice Recognition, Web Integration Let Them Do More Than Just Process Text

Think back to why you purchased a computer. Most likely, you wanted it primarily for word processing, to type text electronically before printing it on paper. Word processors make it easy to create, modify, and correct letters, memos, reports, and even entire books because you don't have to retype the document when editing. And since word processor documents are stored electronically, it's easy to call up a file for later use or send it as an attachment to an electronic message.

Today, word processors do a lot more than simply process text. So if you're making the leap into the digital world, thinking about dropping your existing text editor for something more powerful, or wondering whether you should upgrade to the newest version, here are some buying tips to keep in mind.

■ **What's Hot.** While there are many word processors available, the three best-selling products (Corel WordPerfect 9, Lotus Word Pro 9.5, and Microsoft Word 2000) all bundle more functions and options than you'll ever need. Each of these word-processing wonders is actually part of a productivity suite, offering tight integration with other applications in a multiproduct line. For example, Microsoft Word is designed to look and feel like other popular applications in the Microsoft Office suite, including Excel, PowerPoint, Publisher, Access, Outlook, and FrontPage. Corel WordPerfect 9 works well with products in the WordPerfect Office 2000 suite, including Paradox 9, Quattro Pro, and Corel Presentations. Lotus Word Pro integrates well with applications in Lotus SmartSuite, including Lotus 1-2-3, Freelance Graphics, and Approach.

All programs in a particular suite have a similar user interface. They sport look-alike or



identical pull-down menus, toolbar buttons, keyboard command shortcuts, and proofing tools. The resemblance makes for virtually unlimited opportunities. You can easily expand your computing capabilities as the need arises, because you'll know your way around all suite applications with minimal time wasted reading manuals and users guides.

Why opt for WordPerfect 9, Word Pro 9.5, or Microsoft Word if you're not planning to take advantage of suite partners? Primarily because these best-selling word processors incorporate the latest and greatest business productivity tools. All have integrated voice-powered word-processing capabilities, advanced (but user-friendly) Web technologies, and support for team (workgroup) computing.

Voice recognition. Voice recognition, the continuous-speech technology that makes computer work as easy as speaking into a microphone, is hot. Special versions of WordPerfect 9, Lotus Word Pro 9.5, and Microsoft Word 2000 feature support for voice-powered document creation with powerful speech-recognition

technology. This technology is designed to learn a user's personal way of speaking (a speaker profile). Recognition accuracy increases the more the voice technology is used.

Users use microphones and their voices in addition to keyboards and mice to communicate with the word processor. They use continuous or natural speech (rather than discrete speech punctuated by pauses between each word) to control several word-processing functions. The products provide voice support for standard menu commands such as Open, Save, Print, Cut, Copy, and Paste. They also support speech as a data-input method, letting users enter document text or edit and format documents through voice dictation.

The Corel WordPerfect 9 version included in WordPerfect Office 2000 Voice-Powered Edition, Professional Edition, and Legal Edition is optimized for Dragon NaturallySpeaking 3.0 speech-recognition software, a general-purpose, continuous-speech recognition system that

lets users dictate up to 160 words or more per minute using natural voice. Spoken words automatically appear on-screen immediately transcribed into the WordPerfect document. Similar results occur with Lotus Word Pro, optimized to work with IBM ViaVoice (a competing speech-recognition technology). Microsoft Word 2000 works well with Dragon NaturallySpeaking, IBM ViaVoice, and Lernout & Hauspie's Natural Language and Continuous Speech technologies. Corel and Lotus Office suites bundle microphone headsets with the speech-recognition technology to ensure users can easily dictate text. No speech-recognition application or microphone is included with Word 2000.

Internet technologies. The Internet and World Wide Web have become essential tools for business communication. Increasing numbers of users send documents to colleagues and clients via e-mail, access the Web to post company information or locate information about other products and companies, and share documents with colleagues via the corporate intranet. As a

What's HOT

- Voice recognition
- Internet/Web Integration
- Team (workgroup) computing

What's NOT

Undue emphasis placed on:

- Templates
- Clip art
- Typeface collections

What's NEXT

- Links to mobile recorders
- Improved links to handheld computers
- Simplified file synchronization
- Enhanced Web site publishing

result, don't consider purchasing a word processor offering only limited Internet support.

WordPerfect 9, Word Pro 9.5, and Word 2000 all receive high marks for their Web-enabled toolkits. For example, each one sports a Send command in its respective File menu. If you have Internet access and an installed e-mail application, you can use this command to send the active document as an e-mail attachment.

WordPerfect 9, Word Pro 9.5, and Word 2000 also let users save documents to disk in Hypertext Markup Language (HTML, the coding that defines how a Web page looks). Because these word processors are also smart enough to prevent you from using features the Web does not support, they greatly simplify the task of publishing documents on the Internet or corporate intranet. HTML documents created by WordPerfect 9, Word Pro 9.5, and Word 2000 can be viewed by anyone with a Web browser, regardless of computer platform.

WordPerfect 9 also lets you save files in Portable Document Format (PDF), another useful file type for publishing documents on the Internet or corporate intranet. Once a document is saved as a PDF file, anyone with the Acrobat Reader software (available as a free download from Adobe's Web site, <http://www.adobe.com>) can open and view the document, regardless of the hardware platform or the installed software. The document appears exactly the way it did in the original authoring program.

Another welcome feature is automated connection to the Web. (You'll need an Internet service provider.) This feature, typically found as an option in the word processor's Help menu, provides access to the company's Web site where you can download program patches, updates, and free templates, or read answers to frequently asked questions. You can also use this Internet link to get troubleshooting advice and technical support. For example, Lotus Word Pro 9.5 features a Lotus Internet Support option in the Help menu, with links to the Lotus SmartSuite Home Page, Lotus Customer Support, and the Lotus FTP site. Word 2000's Help menu has a similar Office On The Web link, while the Corel On The Web option in WordPerfect 9 leads to a submenu of links, including Technical Support, Tips and Tricks,

Training and Certification, and Approved Service Bureaus.

Workgroup collaboration. If you work in an office or on a team, you'll want a word processor that lets all users collaborate by sharing documents over the Internet, corporate intranet, or office network. WordPerfect 9, Word Pro 9.5, and Word 2000 each have workgroup (team computing) features.

Microsoft Word, for example, lets users work together on documents using integrated comments. It even supports real-time collaboration with features such as document conferencing. Lotus Word Pro also includes options to simplify workgroup computing. TeamReview lets you send a document to others for evaluation and comment while controlling who gets what editing privileges and who can review which comments, and TeamConsolidate lets you combine multiple documents with review comments into one document for review and evaluation. WordPerfect 9 also lets users add comments to any WordPerfect document.



Lotus Word Pro 9.5, part of the Lotus SmartSuite Millennium Edition

■ **What's Not.** WordPerfect 9, Word Pro 9.5, and Word 2000 each come with project templates, colorful clip art, and numerous typefaces to simplify document design. WordPerfect 9 has a collection of Projects and Scrapbook art clips, Word Pro features SmartMasters, and Microsoft Word 2000 has templates.

Ready-made documents, clip art graphics, and bundled typefaces are helpful, but there's a limit to how many of them you can use. Don't purchase a word processor solely because it offers hundreds of templates and fonts and thousands of graphics. You'll be rummaging through piles of CDs to locate the disc with the picture you need. You'll also have to edit the Windows System font list to ensure that no more than 500 fonts are installed on your system; Windows 95/98 doesn't work well if there are more than 500 installed typefaces. Be sure the word processor you purchase lets you search for pictures by keyword or subject category. Otherwise, you'll waste too much time sifting through the clips. While Corel WordPerfect 9 and Word 2000 let you search your clip collection by keyword, Word Pro 9.5 does not.

■ **What's Next.** Speech recognition, Internet and Web integration, and team comput-

Terms To Know

attachment—Any Macintosh or PC document can be "attached" to an e-mail message in much the same way you would use a paper clip to attach a paper document. You send a file as an attachment rather than pasting its text in the body of a message because an attachment is easier to work with once the file is received and saved to disk.

speaker profile—Information about your speaking style and vocabulary needed for the computer to recognize your voice patterns and identify you to the system.

synchronization—Keeping two or more hard drives or diskettes up-to-date relative to each other by copying the latest version of each file to the appropriate disk or drive. This feature comes in handy when you work with files on both handheld and desktop or laptop computers.

workgroup computing—Groups of users collaborate on the same project, sharing access to files over a local-area network, the Internet, or corporate intranet. This is accomplished through software designed for group work, which usually incorporates features that allow for adding comments, controlling editing, and consolidating several documents into one.

ing are hot word-processing commodities. Expect to see improved support for these technologies with each new product release. In the area of speech integration, for example, expect enhanced voice command and control features for improved recognition accuracy. The technologies will sport larger vocabularies. There will also be enhanced support for links to portable digital voice recorders so you can take voice recordings made while you're on the road or out of the office, download them to your PC, and have the recorded files automatically recognized by your favorite word processor.

You can expect to see tighter integration with the Internet to help corporate users create, convert, and publish documents on the World Wide Web. You'll also find tools that make it easier to create and publish multipage Web sites. [E]

by Carol S. Holtzberg, Ph.D.

Databases

User-Friendly, Interactive Applications Lead The Pack

Databases have greatly benefited from the explosive growth of the Internet. Companies such as Oracle, Microsoft, and IBM have turned a tidy profit developing solutions to help companies keep track of their business and present and sell their products online. Tucked away in the shadows of this e-commerce feeding frenzy cruise the databases that most of us are familiar with, the Accesses, FileMakers, and Approaches; these solutions have provided individuals and small groups with customizable solutions for years.

Many of the forces guiding the top databases are also affecting the new features showing up in the smaller applications. To help you understand what's hot, what's not, and what may be looming on the horizon in database software, we looked at recent releases of several of the most popular applications. Among the applications we considered in preparing this include: Microsoft Access 2000 (<http://www.microsoft.com/office/access/>), FileMaker Pro 5 (<http://www.filemaker.com/>), Lotus Approach (<http://www.lotus.com/home.nsf/welcome/approach>), Corel Paradox 9 (<http://www.corel.com/paradox9/>), Alpha Five, version 4 (<http://www.alphasoftware.com/a5v4/index.html>), Microrim's R-Base version 6.1 (<http://www.microrim.com/Products/RBASE.htm>), and Sun's StarOffice Base (<http://www.sun.com/staroffice>).

■ **What's Hot.** The basic underlying trend in database software is ease of use. Companies are creating user-friendly interfaces, adding intranet/workgroup features, and allowing users to publish their databases



online. In addition, companies are selling their software as part of an integrated suite.

Ease of use. Most database applications maintain a low learning curve for standard usage (Access excluded), and they offer a variety of templates and wizards to help new users get started. The latest version of FileMaker has gone one extra step by designing its interface to resemble that of the most familiar office suite, Microsoft Office 2000.

Part of a whole. Databases such as Approach, Access, and Paradox are part of integrated office suites (SmartSuite Millennium Edition, Microsoft Office, and Corel's WordPerfect Suite, respectively). This allows them to share data with other applications, such as word processors and spreadsheets, within the suite.

StarOffice 5.1 fits the integrated suite metaphor as part of Sun's StarOffice. It doesn't have the complex features of some of its brethren, but it does have one important feature: Unlike the others, it is free (most range from \$100 to \$300 or more). If you're looking for a

simple database and an accompanying office suite, and you don't mind the 65 megabyte (MB) download, try StarOffice.

Intranet collaboration. Many companies build these applications with small groups in mind. They specifically make it easy to go from a single user to intranet/group use. R-Base, Paradox, and FileMaker offer solutions to convert and share information in a workgroup; Access 2000 combines its Data Access Pages and NetMeeting technologies to make for a particularly strong solution.

Internet publishing. Allowing users to publish databases to the Internet is one of the latest feature sets to show up in these solutions, and several of the ones we looked at embrace it. Access extends its Data Access Pages onto the Internet, letting users view, edit, and analyze data in browser windows. Paradox offers similar functioning with Web Form Designer, which is a drag-and-drop solution that lets you publish reports and tables to the Web. In addition, your online reports and tables will update every time a user visits the site. FileMaker features a particularly user-friendly solution, generating a Web-based interface with a simple click and giving you the ability to filter Internet Protocol (IP) addresses so only certain users can access data.

Even though growing pains plague a lot of these databases' Internet efforts (see What's Not), expect to see a lot more in this area in the future (see What's Next).

ODBC. Short for Open Database Connectivity, ODBC is a standard way of letting applications share data, such as a database sharing with a spreadsheet program, mail merging with a word processor, or even sharing information with another type of database. This has become an industry standard, and many of these solutions, including Paradox, FileMaker, Alpha Five, R-Base, and Access, support it to some extent. ODBC works through the inclusion of drivers. For example, if the database you're using has an Oracle ODBC driver, it can share information with Oracle. What each

What's HOT

- Integration
- Open Database Connectivity (ODBC)
- Internet publishing

What's NOT

- Licensing limits
- Supporting just the Windows operating system
- Changing file formats

What's NEXT

- E-commerce
- Support for Linux
- Mobile computing



Alpha Five, version 4

database can talk to depends on what drivers it comes with.

When your business grows. Many of these software solutions can use structured query language (SQL) to access information from larger databases. Access 2000 even includes a free copy of Microsoft's powerful SQL Server, making it one of the most potentially powerful applications here. Using the Upsizing Wizard, you can easily convert an access file into a full SQL Server database, and hence a professional business solution.

■ What's Not. Today, compatibility is a major factor in almost any type of software. Two of the most important features in a database program are compatibility with multiple operating systems and multiple file formats. Another important issue with this type of application is the number of users that can access the data.

All Windows, all the time. Most of these applications are Windows-based, which doesn't make them the best of choices for workgroups that run other operating systems or a combination of operating systems. The exceptions include FileMaker, which has Windows and Apple versions, and the free StarOffice, which runs on Windows, Solaris, OS/2, and Linux.

The miraculous changing file formats. Both FileMaker Pro 5 and Access 2000 offer a new feature that users should be aware of: They've both changed their file formats. Even though the company pushes this feature as an improvement, it also means earlier versions can't read the new file formats (although Access 2000 can save versions in earlier formats, something FileMaker doesn't allow). This is a big consideration for workgroups running FileMaker, which will have to upgrade everyone in the group if they want to upgrade one of them.

Internet publishing. Even though Internet publishing is a hot feature, using many of these databases with the Internet also leaves a lot to be desired. With Access, it's a question of how many users can access it. On an intranet, it works fine; but it wasn't designed to have a lot of people using it at once, and it can stall out quickly when you turn it loose on the Internet.

As easy as it is to put FileMaker onto the Internet, there are style and licensing quirks that can hamper its usability. New with version 5 is the use of cascading style sheets to create the design interface. This feature is not presently supported by Netscape or by older browsers, meaning many people visiting your site will have trouble viewing your page. FileMaker also limits its standard package license to access by up to 10 separate IP addresses during a 12-hour period. Unlimited access, and increased performance, can be had for those willing to shell out \$1,000 (four times the standard \$250 price) for the Unlimited version of the software.

■ What's Next. Even though it's difficult to predict anything in the software industry, features presently hot in big business solutions from Oracle, IBM, and the like, stack the odds in the favor of improvements in several areas.

E-commerce. This is easily the No. 1 improvement to come in database software. E-commerce was a huge success for companies such as Oracle in 1999. The improved business solutions in some of these databases are sure to follow suit in the form of enhanced templates and features that will make it easier for small businesses to develop and operate online stores.

Support for Linux. Another success story in 1999 was the growing acceptance of the Linux operating system. Many of the larger database solutions support the platform or are working on versions that will support this system. Even though StarOffice is presently the only one of our choices to support it, expect other titles to roll out Linux-compatible versions. (But don't expect Microsoft Access to do the same.)

Support for XML and Java. Technologies such as eXtensible Markup Language (XML) and Java allow databases to work better and do more online. Even though some of these solutions use one or the other to varying degrees, as they reach to fully embrace the Internet, support for these standards will grow.

Mobile computing. For telecommuters and those on the road, expect improved functioning to allow users to dial into a network, get data, work offline, and then dial back later to synchronize with the main database.

More robust searching. Data mining, sifting through information to identify patterns and regularities, is already showing up in larger databases. Its evolution will allow users of even smaller applications to eventually work more effectively with their own databases. **LE**

by Rich Gray

Terms To Know

cascading style sheets—A special way of grouping format settings for Web pages that determines how they will look.

data mining—The sifting of business data to find complex patterns and relationships.

e-commerce—Doing business online.

eXtensible Markup Language (XML)—A flexible document format used on the Internet to describe and present data. It allows the designer to tailor the formatting tags in a document.

Internet Protocol (IP) address—The unique address of an individual computer on a network.

Linux—An operating system that is presently challenging Microsoft as a popular and stable alternative to Windows. This operating system is also free.

office suites—Integrated software suites such as Lotus SmartSuite and Microsoft Office that combine several applications, such as a spreadsheet, word processor, and database.

Open Database Connectivity (ODBC)—A common language used to access databases on a network.

structured query language (SQL)—A standard programming language for getting information from and updating to a database.

template—A predesigned document formatted for a specific purpose, such as business letters and invoicing.

Spreadsheets

Polishing Data For Presentations & The Web

The lively competition to build a superior spreadsheet package continues to result in better features and more consistency among applications. And although it might seem like a spreadsheet upgrade involves getting an application that just contains more hoopla and bells and whistles, many of the added functions, such as engineering computation or financial analysis, do address needs for particular occupational segments.

Still, the spreadsheet needs of most users, at least initially, are fairly straightforward, so many may not get around to looking at these elaborate new features or even care about how they work. Take heed, however, that many of the added functions are more beneficial than most spreadsheet users think. For example, two of the biggest changes within spreadsheet programs are improvements regarding their ease of use when creating sophisticated output and Internet accessibility and collaboration.

■ **What's Hot.** Depending on which spreadsheet application you use, you'll probably immediately recognize our list of "hot" choices below.

Refining the look of your spreadsheets. Users have long been able to modify the look of their spreadsheets by doing things such as changing fonts, choosing background colors, and adding charts. For most spreadsheet applications, each new version responds to consumer demand by adding more and more range to how much formatting users can employ. Look for spreadsheets that include more style templates, printing templates, the ability to save customized templates, additional



intelligent formatting, and more versatility in how text and numbers can appear.

The latest version of Excel, for instance, allows users to take advantage of the Autofill feature and quickly format cells based on the formatting of other cells. In addition, Lotus 1-2-3 lets users format formula results based on the formatting of the formula's participants.

We agree, formatting the look of a spreadsheet is not new, but what is innovative is the fact that manufacturers seem to be interested in making the spreadsheet a tool that users can employ for presenting and reporting data, as well as manipulating that data. And, if your data already looks polished in a spreadsheet format, you can save yourself a few steps by electing not to import the data into a word processor or a presentation program before presenting the information to others.

Internet accessibility. Almost every type of application is rushing to incorporate Internet

accessibility, and spreadsheet programs are no exception. The most popular spreadsheet applications—Lotus 1-2-3, Microsoft Excel, and Corel Quattro Pro—give users the ability to transform their spreadsheets into a Web page format. This feature is great if you or your company do a lot of Web publishing.

Spreadsheets also provide users with the ability to easily send spreadsheet numbers across the Web without all the extra work of opening an e-mail application and creating an attachment of the spreadsheet file. Even more convenient is the ability to send selected parts of spreadsheets via e-mail, electronic routing slips, or online meeting software, depending on the office suite you're using.

Just as important, users appreciate the accessibility that spreadsheets provide when they need to import real-time data from the Internet, including stock quotes, interest rates, pricing information, and any other data that is updated on a regular basis. Most spreadsheets are already able to pull in data from other files and computers across a network, but newer versions now make this process easier with Web importing functions that users can learn in order to extract and update data from a Web page for their spreadsheets.

■ **What's Not.** According to avid spreadsheet users, what isn't hot is limiting yourself to only a couple of spreadsheet applications when upgrading and buying software, or attempting to use spreadsheets for personal finance when more proficient programs are available for that purpose.

Limited spreadsheet choices. Microsoft Excel from the Microsoft Office 2000 suite is certainly the most popular spreadsheet product, but you do have other choices. Several less expensive alternative office suites also include good spreadsheet applications. For example, Lotus 1-2-3 (part of the Lotus SmartSuite Millennium Edition) and Quattro Pro 9 (part of the Corel WordPerfect Office 2000 suite) still have devoted users of their own. In addition, StarCalc from

What's HOT

- Refining the look of spreadsheets
- Polished formatting for presentations
- Web access without leaving the application

What's NOT

- Limiting yourself to just a couple of spreadsheet application choices when upgrading or buying software
- Using spreadsheets for personal finance

What's NEXT

- Creating customized spreadsheet applications with programming code
- Expanding the capabilities of interactive spreadsheets within Web pages

Sun Microsystems' StarOffice suite is also gaining ground among spreadsheet users.

Spreadsheet applications are available on every platform, including Windows, Linux, BeOS, and handheld computing platforms such as Windows CE and Palm OS. And compatibility with other users should not be an issue; almost all of these spreadsheet applications save files in formats that Excel, Lotus 1-2-3, and Quattro Pro can read.

If you aren't currently working with any particular spreadsheet program or if you're thinking about changing programs, make sure to check out all the features touted by other spreadsheet applications. Many are well-designed and offer a good variety of features. Plus, if you buy a spreadsheet program that is sold separately from an office suite, you can save yourself additional dollars by staying away from pricey software packages that offer applications you just don't need.

GS-Calc by JPS Development (<http://www.jps-development.com>) is a solid spreadsheet application for computers running Windows 95, Windows 98, or Windows NT; yet, it is priced at only \$19.95 and offers helpful features, including multiple Undo and Redo actions, that other spreadsheet applications don't have.

Using spreadsheets for personal finance. If you are still using a spreadsheet to balance your checkbook or amortize your mortgage, we have one question to ask: why? Spreadsheets used to be the application of choice for personal finance, but these days, you're better off using applications such as Intuit's Quicken and Microsoft Money that can automate personal finance tasks.

For example, personal finance applications can perform functions such as balancing your checkbook, budget analysis, investment management, retirement planning, loan amortization, and tax computations with more sophistication and less user effort. In addition, these applications have built-in Internet capabilities for advanced needs such as online banking.

Using spreadsheet programs for financial modeling, accounting, and other corporate finances is still a good idea; however, unless you have some highly specific needs or loads of free time, don't waste your efforts on a spreadsheet for personal finances.

■ **What's Next.** If you are looking for better automation methods to customize your spreadsheets, streamline your calculations, or present an interactive spreadsheet online, the manufacturers of spreadsheet applications will hopefully satisfy your needs in the near future.

Editing spreadsheets online. Developing interactive spreadsheets for the Web is an area that will continue to grow. Some third-party applications already offer this feature for existing Excel spreadsheets. And Excel 2000 can now publish a spreadsheet to a Web page where other users can add and edit its data via a Web browser. This is already a hot feature, especially with intranet users within companies, and more software manufacturers are sure to expand upon the idea and offer related, task-oriented Web features in future upgrades.

Customizing with programming languages. Other features that are growing in popularity are the programming tools provided with several spreadsheet applications. These tools allow users to customize a spreadsheet application to a high degree, even to the point of creating a new application. If you create spreadsheets for others to use, you probably would like to make them as explicit as possible in order to limit user errors and reduce time spent training users to use the spreadsheet.

With these programming tools, you can create spreadsheets with tailored interfaces, custom menus and custom commands, and automated actions that run in the background. Excel and Quattro Pro use the Visual Basic for Applications

(VBA) programming code, whereas Lotus 1-2-3 uses the LotusScript programming code.

This programming functionality can be particularly useful in fields such as science, engineering, statistics, and finance. In the past, a user (an engineer, for example) would have to write an application, usually in a programming language such as PASCAL or C, that could perform complex calculations on multiple inputs. But, with the current power of spreadsheet applications and their programming functions, that same engineer could design a spreadsheet that automatically performs certain calculations. Furthermore, the open table format of a spreadsheet can allow the engineer to better visualize the problem and see the work in action. In this respect, the future of spreadsheet applications is expected to yield more related benefits as manufacturers continue to delve into the programming arena.

Don't be dissuaded by the sound of the word "programming." The spreadsheet's programming capabilities are not geared solely toward the high-tech industries; these functions can be used by anyone who wants to develop more sophisticated spreadsheets. Programming code can offer much more than macros can, and because they run in the background, they can streamline your spreadsheet application.

The nature of VBA or LotusScript does not require you to take a college course. Start out simple by incorporating a piece of code when you need to perform a task better and then expand your programming abilities from there. More resources via bookstores, the Web, and consulting firms are becoming available to help users (in many professional fields) utilize the robust and versatile power of spreadsheets. [E]

by Tracey Dishman Patterson



Corel WordPerfect Office 2000
(includes Quattro Pro 9)

Terms To Know

LotusScript—A programming language included in the Lotus 1-2-3 application. Like VBA, it allows users to automate tasks and customize the application so it works more efficiently.

macros—A series of commands and functions grouped under and accessed by a single name.

Users create and use macros to automate repetitive or complicated tasks.

style template—A guide that saves a particular formatting scheme (the font type, size, background color, column size, etc.) for later use.

Visual Basic for Applications (VBA)—This

is a pared down version of Microsoft's Visual Basic programming language that is now built in to some spreadsheet applications. VBA code is used to automate tasks so they run in the background, thereby customizing the application to suit the developer's specific needs.

Presentation Software

Multimedia & Interactive Content Make Presentations More Effective

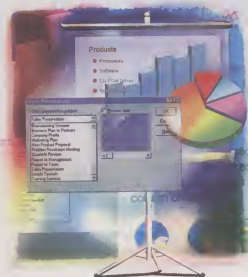
Presentation software has taken great strides forward since the days of using simple drawing or word processing programs to create overheads. The software of today enables users to create snazzy presentations quickly and easily.

■ What's Hot. Plain-text presentations induce sleep, and they aren't the best way to convey information. This is why most presentation programs allow you to easily create stimulating presentations using clip art, templates, photos, audio, video, and much more.

Templates and clip art. Many presentation programs include a wide selection of predefined templates and clip art, allowing you to create professional-looking presentations quickly and easily. Add-on programs, such as Visual Thunder Multimedia from Muddy Shoes Software (<http://www.muddyshoes.com>), feature additional clip art, photos, sounds, and animation to spice up your projects.

Built-in graphics editors. Modifying graphics rather than using them straight out of the box can help give your presentation a bit of individual style. Programs such as Corel Presentations 9, part of WordPerfect Office 2000 (<http://www.corel.com>), feature graphics editors that allow you to crop, resize, or customize illustrations and photos without launching or learning how to use a separate application.

Multimedia content options. There's more to good presentation software than templates and clip art. Many programs can integrate multimedia content, including a variety of



audio, video, and graphic file formats, as well as interact with external programs, files, and Internet resources. If you're ready to free yourself from static slides, consider robust presentation tools to augment or replace your present software. Products such as LMSoft Presenter Pro (<http://www.lmssoft.com>) let you build complex multimedia presentations without using programming skills. You can assemble graphics and embed movies and audio. And, you can add conditional branching to tailor your presentation to your users' input. In addition, you can distribute the presentation as an executable file, a self-running CD-ROM, or over the Internet.

Macromedia Director (<http://www.macromedia.com>), a powerful multimedia authoring tool, creates complex and compelling presentations combining graphics, animation, text, video,

and a complete scripting language. Director has a higher learning curve than other presentation programs but offers greater flexibility and customization. It also optimizes output for the Internet.

Multiple output options. Presentation software should generate multiple output types, including slides, self-running slide shows, executable files, and Hypertext Markup Language (HTML) files, creating finished presentations that can run without the software that created them. Microsoft PowerPoint (<http://www.microsoft.com>), Vizacom Inc.'s Harvard Graphics Easy Presentations (<http://www.spc.com>), and Corel Presentations provide these capabilities.

■ What's Not. If you are still using static slide presentations, too many templates, and programs that aren't compatible with other popular applications, you need to get out of the dark ages.

Static slide presentations. Stop using your word processor for creating presentations. Even though it does the job, it can't include the interactive touch that captures a viewer's attention. Reasonable pricing, ease of use, and a variety of features in the latest presentation software means there's no excuse for boring slides.

Overused templates. Built-in templates are handy when you have to create an emergency presentation in record time, but you shouldn't rely on them too much (unless you want your presentations to look like everyone else's presentations). Take the time to learn how to create custom templates and backgrounds. Keeping slides fresh will help prevent participants from viewing your presentations as siesta time.

Limited compatibility. Microsoft PowerPoint can generate HTML output from finished presentations, but the files are only 100% viewable with present versions of Microsoft Internet Explorer for Windows. Attempting to view them with any other browser, including the Macintosh version of Internet Explorer, returns a warning that the browser may not be able to

What's HOT

- Templates and clip art
- Built-in graphics editors
- Multimedia content options
- Multiple output options

What's NOT

- Static slide presentations
- Overused templates
- Limited compatibilities

What's NEXT

- Polling
- Forms
- Web conferencing

correctly display the presentation. Users can click a link to continue, but programs should generate HTML code usable by any browser.

■ **What's Next.** The ability to distribute presentations over the Internet opens up new possibilities for interactive content. Look for the following capabilities in the near future.

Polling. Polling allows you to determine audience opinion on a subject using either multiple choice or simple yes/no questions. Polling also provides additional incentive for your audience to participate.

Forms. Most traditional presentations include a request for feedback, usually in the form of a questionnaire to be dropped off on the way out the door. Presentation software can accomplish the same purpose through online forms. Forms can be simple requests for input or elaborate marketing research tools, providing both quick feedback and mounds of data.

Web conferencing. Web conferencing takes Internet-enabled presentation technology further with real-time, hosted presentations. Web conferencing programs make it easy to present a combination of slides, audio, video, and animation, as well as interactive content such as polls, messaging, and whiteboard discussion.

Simple presentation programs, such as PowerPoint or Presenter Pro, generate output that users can save as HTML files, allowing anyone with a Web browser to view the presentations. Web conferencing is more akin to video conferencing, allowing two-way interactivity between the presenter and the audience. Even though video conferencing requires specialized equipment, Web conferencing promises to achieve the same results using standard off-the-shelf browsers and network connections.

A Web conference audience may include attendees physically present in your meeting room, as well as viewers at other locations. Remote viewers won't be passive viewers; they'll be interacting with you through polls and live question-and-answer sessions, using integrated audio- or text-based chat. Group collaboration will allow remote viewers to participate in marking up documents, using whiteboards to express ideas and concepts. In addition, presenters may log all interactivity.

Web conferencing is not new, but these programs are still in their infancy. In addition, they are expensive and hard to learn, and they usually require dedicated hosting services. In the near future, look for these services to become more robust, less expensive, and probably able to run on your own servers.

Companies and products to watch include:

- **Presentation.Net:** A browser-based conferencing service by WebSentric (<http://www.websentric.com>). It runs on WebSentric's servers and can convert presentation files into Dynamic Hypertext Markup Language (DHTML), which is viewable in Netscape Navigator or Internet Explorer.
- **Macromedia:** In December 1999, Macromedia announced a new Shockwave multi user server. Macromedia Director allows users to add chat to a Web site, with a 50-user license; the new multiuser server will increase the capacity to thousands.
- **ActiveTouch:** WebEx's ActiveTouch (<http://www.webx.com>) combines Web conferencing with telephony for Web presentations with audio, whiteboards, and polling.
- **i2i:** Contigo Software's i2i (<http://www.contigo.com>) is a Java-based system that runs on



WordPerfect Office 2000 (includes Corel Presentations 9)

your host server. It includes Web tours, interactive chat, whiteboards, and polling.

• **RealPresenter**

G2: This plug-in from RealNetworks (<http://www.realnetworks.com>) streams slide presentations over the Internet.

■ **Savvy Shopping.** When shopping for presentation software, consider immediate and future needs. Look for software that provides an easy-to-use, intuitive workspace but don't skimp on tools that can make your presentations more powerful and effective. [E]

by Tom Nelson and Mary O'Connor

Terms To Know

conditional branching—

The ability to display content based on user input, instead of a programmed sequence.

Dynamic Hypertext Markup Language

(DHTML)—Dynamic local updating of a Web page. With regular Hypertext Markup Language (HTML), every time a user changes a page, the browser must reconnect to the Web server. DHTML allows the browser to make changes to the page on the fly.

Hypertext Markup Language (HTML)—

The underlying language that a browser interprets to display a Web page.

messaging—The ability to send and receive comments during a presentation, usually in the form of text.

self-running presentation—

A small, executable program that doesn't require the presentation software that created it to run.

slide show—A presentation made up of multiple slides. Each slide automatically displays in a programmed sequence. Slide shows can terminate when the last slide displays or loop back to the beginning to start the sequence again.

streaming—The sending of data, usually audio or video, in real-time, which doesn't require your browser to download the entire file before presenting the data.

Web conferencing—The ability to run an interactive presentation over the Internet or an intranet.

Viewers may participate in the presentation by asking questions, sending comments, or responding to polls or questions from the presenter.

Web tour—The ability to control which Web pages the attendees of a Web conference view. Web tours ensure everyone is viewing the same page at the same time, and they may be used to solicit feedback.

whiteboard—An electronic chalkboard. Whiteboards allow the presenter to dynamically mark up a document or to display new information obtained during the presentation. Attendees can also enter their suggestions and comments on whiteboards.

Desktop Publishing Software

Competition & High Customer Expectations Result In New Features & Tools

The desktop publishing revolution began in the mid-80s with the introduction of the Apple Macintosh computer, the Apple LaserWriter printer, and Aldus PageMaker desktop publishing software. Today, many products are available to meet your specific desktop publishing needs, whether you need to produce a quick flyer or a technical manual with thousands of pages.

Desktop publishing programs come in two main types: personal and business. Personal publishing includes greeting cards, invitations, and flyers. Files produced by personal publishing software are for output to laser or inkjet printers. Broderbund's PrintMaster Platinum 8.0 and PrintShop Deluxe (<http://www.broderbund.com>) and Corel's Print House (<http://www.corel.com>) are popular home publishing programs.

Business publishing programs generate files that commercial printers can print in their native file format or as Portable Document Format (PDF) files. To further define this type, you can place business publishing programs into two categories. One targets users who need to create professional looking publications but have little or no training in graphic design. Programs in this category include Microsoft Publisher 2000 Deluxe (<http://www.microsoft.com>), CorelDraw 9 Graphics Suite, and Adobe PageMaker 6.5 Plus (<http://www.adobe.com>). (NOTE: PageMaker offers a number of design and typographic controls for experienced designers, but Adobe



repositioned it for the business market with the introduction of Adobe InDesign.) The second category targets professional designers who demand greater control over typography and design functions. Professional programs of this nature include QuarkXPress (<http://www.quark.com>) and Adobe InDesign.

What's Hot. Most top companies that manufacture desktop publishing software try to include the latest and greatest tools and features with their software. Many applications on the market today include features such as built-in graphics editors, color-management tools, master-page layout, and composition tools.

Built-in graphic editors. Many publishing programs feature built-in graphics editors. For

example, Corel Print Office 2000 includes Photo House 5; Publisher Deluxe includes Picture It! 99; and PageMaker Plus includes PhotoShop LE (a light version of Adobe PhotoShop).

Composition tools. Fixing bad line breaks and poor letter and word spacing is a time-consuming task. Composition tools automate this task. These tools normally fix one line at a time, which can result in awkward spacing on surrounding lines. InDesign, however, features a multiline composer that looks at how changes affect up to 30 adjacent lines of text. Publisher's AutoFit Text tool fits small sections of text within a defined space. CorelDraw's Shape tool fixes letter or word spacing. QuarkXPress includes manual and automatic kerning and tracking.

Color management. Color management offers predictable results when sending documents to different output devices. This is important because documents may be viewed in multiple ways, including on computer monitors, in print, or on the Web.

Publishing programs need to work within specific color models and support device color profiles. Color models define how colors are created (usually by blending a percentage of base colors to create new colors). Popular color models include red-green-blue (RGB), used by most monitors, and cyan-magenta-yellow-black (CMYK), which is for commercial printing. Many programs also support commercial printing ink-color systems, including Pantone, TruMatch, and Focaltone.

Profiles ensure the colors you see on your monitor will match—as nearly as possible—the colors in the end use of the document. No two monitors, however, display color the same way. The colors in a printed version of a document look different from the colors in the on-screen version. The on-screen version also looks different from the Web version because of the Web's limited color range. Profiles compensate for these variances by adjusting the color output of a program to match the display's capabilities.

Publisher supports RGB and CMYK. QuarkXPress, PageMaker, CorelDraw, and InDesign

What's HOT

- Built-in graphics editors
- Composition tools
- Color management

What's NOT

- Using the wrong program
- Limited output options
- Poor tech support and overpriced upgrades

What's NEXT

- Wider acceptance of PDF files
- Plug-ins
- Smart objects



Adobe PageMaker 6.5 Plus

support many color-management systems, including RGB, CMYK, and Pantone.

Prepress output. When sending documents to a commercial printer, it's important to include a copy of every font and graphic used in the document, or the document may not correctly print. Unfortunately, it's easy to forget a font or overlook a graphic. Programs that automate the prepress process make the task easier and less prone to errors. PageMaker, InDesign, and QuarkXPress gather the required files and embed them within the document or place copies of them within the document folder. This process also makes document archiving easy because all the required components are present.

Master pages. A program applies all the items and specifications on a master page to all pages within that document. Common master-page elements include margins, columns, headers, footers, borders, logos, and other artwork. Some programs support only two master pages, a left and right page; others allow you to apply multiple master pages at will. CorelDraw applies master elements through master layers. Publisher uses templates to achieve some of the same goals as master pages, including different facing pages. PageMaker, InDesign, and QuarkXPress support multiple master pages.

What's Not. When you look for a desktop publishing program, find an application that is dedicated to publishing. In addition, make sure your application doesn't use fake fonts or give you limited output options.

Using the wrong program. It doesn't make sense to use a word processor for publishing when desktop publishing programs are inexpensive, easy to use, and have dedicated publishing features.

False fonts. Some publishing programs use a font to create alternate-style representations

when no such style for that font exists. This can lead to printed output with mismatched or missing text or require a printer to use a substitute font, which may not have the same character size and spacing as the fake font.

Limited output options. If you want documents printed by a commercial printer, be sure to find out what file formats it accepts and whether a particular program supports those formats. Most printers will accept QuarkXPress, PageMaker, and InDesign files; some will also accept PDF files. The next time you need to print 500 copies of a publication, you'll appreciate being able to take the file to a local print shop rather than trying to print it yourself.

Poor tech support and overpriced upgrades. Some vendors provide poor, if any, technical support. Often the response is they will fix the problem in the next version. This means you'll have to pay for something that should have worked properly in the present version. Increased competition in the marketplace should lead to better support and more reasonably priced upgrades.


What's Next. In the future, increased competition and high customer expectations will continue to result in exciting offerings in desktop publishing. Look for the following additions to appear in your favorite programs.

More features for business publishing. QuarkXPress is feeling the heat from InDesign, which may result in lower upgrade prices, more features, and faster bug fixes. Prices for professional programs may not drop, but pressure on them will increase. Adobe repositioned PageMaker for business with the inclusion of Photoshop LE, a clipart library, and many new templates. PageMaker 6.5 Plus brings industrial-strength publishing to a new market segment, and it may force other vendors to increase their programs' features.

Wider acceptance of PDFs. When Adobe introduced Acrobat and PDF files, allowing users to view documents on any platform without needing their creation programs, one of the goals was to have commercial printers accept these files. PDFs are self-contained files that solve the problem of documents being sent to a printer with missing fonts or graphics. In the past, many printers were reluctant to accept PDF files because of the difficulty in fixing output problems. Recent changes to Acrobat have resulted in more robust and reliable files and fewer output problems. New third-party prepress tools also allow printers to work with and manipulate PDF files.

Plug-ins. Plug-ins allow third parties to add functionality to a program. QuarkXPress and InDesign accept plug-ins (called XTensions in QuarkXPress). InDesign took the concept of plug-ins even farther: almost all its tools and features are in plug-in format. If a tool isn't working correctly, Adobe can release a fix as a plug-in, instead of rereleasing the product.

Plug-ins should put bug fixes and new features on the fast track because less time is required to integrate and test them. Other companies are likely to follow suit and use plug-ins to offer new features and faster product support.

Smart objects. Fonts are already smart objects; they contain the data needed to accurately reproduce them, as well as hints about how to scale and size them. Graphics could be smart objects, able to automatically scale themselves to properly fit a given space or adjust color or resolution based on selected output. 

by Tom Nelson and Mary O'Connor

Terms To Know

Kerning—Adjustment of the spacing between letter combinations. Without kerning, a line of type occupies more space and appears less uniform.

plug-in—A module that adds new functionality to a program without changing the program's base code.

Portable Document Format (PDF)—Files that users may view on any platform, without the program that created them. To view PDF files, users need the free Adobe Acrobat Reader software. Creating a PDF file, however, requires the full Acrobat program.

prepress—The stage between creating a file and outputting it on a commercial printing press.

template—A ready-to-use, permanent document setup with basic layout, color schemes, formatting commands, background graphics, and title styles.

tracking—The spacing between letters and words. Unlike kerning, which you apply to pairs of letters, tracking text divides space equally between characters.

Web Browsers

Multimedia Functionality & Simplicity Of Use Lead The Way

The World Wide Web is definitely hot. Online employment sites can help you track down your next dream job. Stock sites let you buy and sell at a moment's notice. Up-to-the-minute news sites allow you to watch video clips at the office. And parenting sites provide you with tips, advice, and information on topics as diverse as toy safety and family vacations.

In order to take advantage of the latest and greatest features online, however, you need to be able to view sites the way their creators intended. Your Web browsing experience will depend in large part upon the Web browser you use. If you conduct some of your personal finance activities online, you'll want a browser that has encryption features for security purposes. On the lighter side, if you don't have Shockwave animation capabilities, for instance, you won't be able to experience "The Amazing Snoopy" and other Peanuts cartoons.

At any rate, no matter what your online needs are, you'll benefit from reviewing our summary of what's hot, what's not, and what's next on the Web browser scene.

■ What's Hot. If you're thinking about switching Web browsers or learning more about the one you already have, here are a few robust areas to watch.

Internet Explorer as top choice. The "browser war" seems to be at a stand-still, and although no one has officially surrendered, it appears as if Microsoft's Internet Explorer (IE) has won the battle for top spot. Various browsers, including IE, Netscape Navigator (part of the Netscape Communicator suite), and Opera, have been in a fierce battle for



market share during the past few years, but the numbers are now settling, and it looks like IE is on the top of the heap.

Navigator led the browser pack early on, but the most recent figures from StatMarket (<http://www.statmarket.com>) show that more than 75% of Web surfers use IE, while the rest are primarily Navigator devotees (with a handful of other browser users thrown into the mix, as well).

Still, there are more than just the big two browsers, so pick one that's right for you. You'll find a comprehensive review of several browsers in "Choosing A Web Browser," an article available on the *Smart Computing* Web site (<http://www.smartcomputing.com>). (NOTE: Use the search tool toward the middle of the *Smart Computing* home page to search for this article title.)

Web radio. IE and Navigator may not be the only two Web browsers available, but their hot new features often determine where

the market is headed as a whole. What's hot is Web radio, and the latest versions of IE and Navigator both have built-in radio components. Different features include: a range of categories such as rock, news, alternative, and classical stations; a radio station playlist that you can customize; and detailed song information.

Integrated plug-ins. Not that long ago, if you wanted anything more out of your browser than the ability to display text and graphics, you had to download a separate "plug-in." Plug-ins are small applications that add more functionality to and operate as part of a Web browser.

For instance, if you wanted to listen to an audio clip, you might have to download and install an audio player from a third-party site. But these days, many supplemental applications are integrated into browsers, requiring little effort on the part of the consumer. Netscape Navigator users can check which plug-ins they have installed by viewing About Plug-ins from the Help menu, and Opera users can get more information at http://www.opera.com/plug_in.html.

More components. Web browsers aren't just for browsing anymore. New releases of IE and Navigator are constantly adding new components and removing unused ones, leading to a suite of useful Internet tools. Mail clients, for example, have been integrated into suites for quite some time, but there are other components that you may not be aware of.

Along with Web radio, browser suites can include tools for creating Web pages (Netscape Composer, for example), chatting in real-time with other Internet citizens (by using AOL Instant Messenger), and receiving real-time news stories and market information (such as The New York Times Explorer bar for IE5).

Content filtering. The Web isn't just for adults; children use it for school projects, entertainment, and more. Keeping them away from the seamier side of the Internet can be a difficult task, though, so it's good to know

What's HOT

- Microsoft Internet Explorer
- Integrated radio and plug-ins
- Suites of useful components
- Better performance and added simplicity

What's NOT

- Paying for browser software
- Complicated downloads that consume too much hard drive space
- Pushing content through subscriptions

What's NEXT

- Ongoing Microsoft dominance
- E-commerce integration
- Advanced security features
- More built-in multimedia capabilities



Microsoft Internet Explorer



Surf Monkey

there are some automated tools that can help you accomplish this feat.

Surf Monkey from SurfMonkey.com (<http://kids.surfmonkey.com>) works on top of IE, whereas Genesis is a new product from Southern Oracle Software (<http://www.southern-software.com>) that stands on its own, and NetForKids from WebData Systems (<http://www.webdatasystems.com/NetForKids/index2.html>) lets users set two different security modes.

Invisible benefits. While many software developers try to wow consumers with flashy features, the smarter ones know that to keep customers using a product, they must perform well. Fortunately, Web browser developers are meeting this demand by working to increase speed, stability, performance, and security.

For instance, Genesis' search tool speeds up searches by eliminating many of the banner ads. And Navigator touts its security features; many of its newer versions protect data transmissions with Secure Sockets Layer (SSL) 3.0, the latest version of the de facto encryption standard. In addition, IE is also highly regarded for its speed and stability.

SmartUpdate simplicity. Let's face it, it's tough keeping track of all the software on your computer. Knowing exactly what version you have, whether you have the most recent version, and where everything is located is a huge chore.

Navigator's SmartUpdate feature attempts to solve your Web browser update problems by notifying you of the most current versions of your installed software. Plus, it even helps you download and install the software upgrades with one click, decreasing download time by only installing the necessary components rather than a full version of the software. For more information, see <http://cgi.netscape.com/cgi-bin/su/intro.cgi>.

■ **What's Not.** Web browsers really haven't been around for that long, but they've undergone some radical changes during their short life span. Below is a list of what the industry is moving away from.

Paying money for Web browsers. When it comes to Web browsers, there is such a thing as a free lunch. First of all, almost all new personal computers come bundled with Web browsers. Secondly, if you don't have a Web browser or don't like the one you have, you have plenty of free options to choose from.

The big two, IE and Navigator, as well as other Web browsers, are all available as free downloads. Other free browsers include NeoPlanet (<http://www.neoplanet.com>), HotJava from Sun Microsystems (<http://java.sun.com/products/hotjava>), and the aforementioned Surf Monkey. Some Web browser programs also offer CD-ROMs or diskettes if you don't want to download the program, but these tend to cost consumers (some charges are minimal).

Big footprints. In computer-speak, a footprint is the amount of space that a particular piece of hardware or software occupies. This can refer to the space a peripheral requires on your desk, or it can refer to the amount of memory and system resources that a software program requires.

One of the trends in recent years has been toward developing programs with increasingly large system requirements, and it seems as if each new version of any Web browser is guaranteed to take up more space on your hard drive. This assumption isn't always the case, though, and system

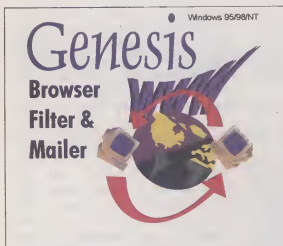
requirements aren't sticking to an exponential curve. Even so, this factor might explain the popularity of Opera (even though it costs \$35 per copy), a small but powerful browser, and Lynx (<http://lynx.browser.org>), a text-only browser that works well on low-end systems (but not on Windows 3.1 or 3.11).

Pushed content. Buzzwords come and go, and one phrase that used to have the computer world excited was "push." Push technology is when Web sites push their content to the consumer according to a preset schedule. In the "push" model, rather than enticing viewers to come to their Web sites, site creators push online information to consumers via various mechanisms, including desktop tickers, screen savers, and e-mail messages. (EntryPoint, formerly Pointcast, is one of the best-known of these push technologies.)

But push, with the exception of e-mail, is arguably on the downswing, and a piece of evidence regarding this decline is found in the Navigator evolution. Navigator used to include a component called Netcaster, which is where users could subscribe to channels and relevant information would then appear on the Desktop, but Netcaster has been dropped from the latest version of Communicator. On the other hand, IE still features the Channel Bar, another form of push technology, so we'll have to wait and see how this plays out.

NCSA Mosaic usage. And now, a brief requiem for Mosaic, the first widely distributed graphical Web browser. Created largely by Marc Andreessen, a student at the University of Illinois' National Center for Supercomputing Applications who later went on to co-found Netscape Communications, Mosaic revolutionized the World Wide Web. Although Mosaic is still available from the center (<http://www.ncsa.uiuc.edu/SDG/Software/Mosaic>), it's no longer supported





Southern Oracle Software's Genesis

and does not include many of the features of newer Web browsers. Still, a look at Web browsers is not complete without mentioning Mosaic, so for some interesting history, be sure to visit the Web site.

■ **What's Next.** Making predictions is always a tricky business, especially concerning the Internet, which seems to change between when you go to sleep at night and when you pour your first cup of coffee the next morning. Even so, some trends are bound to continue.

Ongoing Microsoft dominance. Microsoft has a knack for seeing where the computer industry is headed, and even though it wasn't the first company to enter the Web browser market, IE has steadily outpaced Netscape and other Web browsers, and there's no indication that this trend will stop. Unless the government orders Microsoft to strip its browser from its Windows operating system (which doesn't seem likely, despite the recent anti-trust rulings), you can expect IE to be the dominant browser for quite some time.

E-commerce integration. Everywhere you turn, you'll see evidence that online shopping is booming. Web sites with something to sell are attracting a record number of shoppers. For example, according to America Online, AOL members spent \$2.5 billion in online retail sales this past holiday season, as opposed to \$1.2 billion a year ago. It is inevitable that this increasing online activity will make its mark on Web browsers. Actually, one of the first signs that it already has is the Shopping feature on the latest version of Navigator; this button transports users directly to the Shop@Netscape showcase.

As further proof, consider Microsoft's new Passport feature, an e-commerce service (<http://www.passport.com>) where consumers can create a single "wallet." This tool requires a sign-in name and password for use with participating Web sites. We predict that in the future, this feature or some aspect of it will be incorporated directly into the IE Web browser.

More built-in multimedia capabilities. Once upon a time, Web browsers could display little more than text and static graphics. Then developers created plug-ins so users could download and play audio and video clips. Next came the widespread use of streaming audio, where users who had the necessary plug-ins could play clips as they transmitted across the network, rather than entirely downloading them first.

As multimedia enhancements occur, it's likely that even more capabilities will automatically be included in Web browser programs.

Some of these enhancements are probably capabilities that can't even be imagined today. One area to watch is audio software (one candidate is the RealPlayer) as it becomes a de facto standard for Web browsers.

Continuing enhancements. Here's a no-brainer: Web browsers will continue to evolve and be enhanced by developers. We can even back up that statement by discussing the direction taken by Netscape. Despite the fact that IE has garnered such a large percentage of Web surfers, Netscape continues to add new features to its Communicator components, and Navigator users can expect to see a wide range of improvements.

These include HTML layout enhancements designed to improve Navigator's performance, continued integration support for Java, and increased search capabilities. For more details, visit the "Netscape Communicator Source Code and Future Directions" Web page at <http://home.netscape.com/browsers/future>. [E]

by Heidi V. Anderson

Terms To Know

clients and servers—A client-to-server relationship describes when one computer, the client, makes a request of another computer, the server, which then fills the request. A Web browser can also be called a Web client because a user can make a request by typing the address of a Web page in the browser's Address or Location field, and in response, the Web browser asks the Web page's remote server to transmit the requested page so it can display the page on-screen in the browser window.

e-commerce—The electronic transmission of commercial activities via the Internet, or more specifically, the World Wide Web.

Businesses that buy and sell goods online are known as e-commerce companies.

footprint—The amount of space a particular piece of hardware or software occupies; this can refer to the space a peripheral requires on your desk, or it can refer to the amount of memory and system resources that a software program requires.

plug-in—These relatively small applications add functionality to and operate as part of a Web browser program. For the most part, users have to download and install separate plug-ins for various types of functions, but some Web browsers now come

bundled with a few essential plug-ins.

push—When information is pushed to the consumer from an online source via various mechanism, including desktop tickers, screen savers, or e-mail messages. Rather than requiring users to visit certain Web sites, these Web sites push information to the consumer per a preset schedule.

Secure Sockets Layer (SSL)—Secure Sockets Layer is a security protocol for transmitting information over the Internet. SSL uses a key to encrypt data sent over a network connection. (SSL capabilities are already built into each Netscape browser version.)

Plug-ins, Add-ons & Offline Browsers

More Bandwidth & Faster Systems Lead To Better Software

As long as there have been browsers, there has been a need to supplement the browser's capabilities with plug-ins and add-ons. Since low bandwidth and slow-loading pages have plagued Web users, there has also been a need for offline browsers. Although 2000 will bring a new set of changes to the Web and improvements to browsers and Internet connections, it's a safe bet that additional software will be needed to enhance the browsing experience.

First, let's clarify some definitions. **Plug-ins** are programs that add additional capabilities to your browser. If a new graphics file format comes out, a plug-in will enable your browser to view graphics in that format when they appear on a Web page you visit. **Add-ons** are programs that usually work outside of the browser environment. The browser calls on and opens a separate program to do jobs, such as playing streaming media or reading a specially formatted document, it cannot do itself. **Offline browsers** let you download entire World Wide Web sites to your hard drive so you can read them while disconnected from the Internet.

We looked at the trends for these products and found some real surprises. What's driving the trends, however, is not surprising: increased bandwidth, more powerful and affordable computers, and the increasing desire to do things on the Web instead of



passively reading Web sites. According to Tom Hale, vice president of product marketing and Web publishing for Macromedia, "Plug-ins and add-ons that allow interactivity are what's popular. Users want a higher level of interaction."

■ **What's Hot.** Even in the age of humongous hard drives, users go lean and mean when it comes to plug-ins and add-ons. A year or two ago, folks would pile on all the add-ons when downloading a browser. Then they would periodically sift through the Netscape browser plug-ins page (<http://home.netscape.com/plugins/index.html>) looking for cool things to play with. (Users with Internet Explorer did the same thing at

Microsoft's Windows Update page, <http://windowsupdate.microsoft.com>.) Now, people have a handful of must-have plug-ins and add-ons; they wait until the need arises before downloading more.

Our short list of the hottest plug-ins and add-ons of today includes RealNetworks' RealPlayer (<http://www.real.com>), Macromedia's Shockwave and Flash (<http://www.macromedia.com>), and Apple's QuickTime (<http://www.apple.com/quicktime>). These applications are all for viewing multimedia files. Also high on the list is Adobe Acrobat Reader (<http://www.adobe.com/products/acrobat/readermain.html>), which is for reading specially formatted documents that appear on your computer just as they would on a printed page. All of these are available via the Netscape plug-ins page.

As bandwidth has increased, streaming audio and video have also improved. Of the add-ons mentioned above, RealPlayer continues to lead the pack. You can start your day with the news and weather from anywhere in the world by listening to a local radio station on RealPlayer. You can also tune in to a variety of audio and video broadcasts, both live and recorded, throughout the day.

Plug-ins such as Shockwave and Flash are also hot. Shockwave is widely used for Web content and games. At the Sharper Image Web site (<http://www.sharperimage.com>), you can see how your potential purchase actually works, thanks to the site's Shockwave-enhanced product demonstrations. Flash is so popular that it has its own search engine, Flahoo (<http://www.flahoo.com>). "Flash is used by major sites because it downloads quickly and doesn't rely on high bandwidth," Hale says.

Today's browser users are sending a message to companies that make browsers: Give us something that makes organizing and using our bookmarks easier. This desire has

What's HOT

- Streaming audio/video
- Plug-ins that enable interactivity
- Bookmark add-ons

What's NOT

- Virtual Reality Modeling Language
- Site commentary plug-ins
- SmartDownload
- Stockpiling plug-ins before you need them

What's NEXT

- Bigger bandwidth and faster computers enabling better streaming audio/video
- Searchbots for all kinds of searches
- Giving PDF some competition with Flash

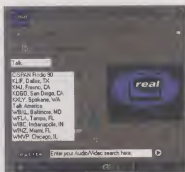
led to the success of add-ons such as Powermarks (<http://www.kaylon.com/power.html>) by Kaylon Technologies.

Offline browsers are extremely useful anywhere that downloading is slow and the user's time is precious. Elliot Noss, president and CEO of Tucows, the popular software download site, says, "Offline browsers are a popular category internationally," largely because Internet usage is still metered and paid for by the minute in many countries outside the United States. If you're traveling overseas frequently, you may want to grab one from the Tucows site (<http://www.tucows.com>) so you can read your favorite sites without spending a lot of money.

These browsers are also useful because they can save Web users time. Given today's congested Internet traffic, if you don't have a high speed Internet connection and are stuck at a 28.8 kilobits per second (Kbps) connection or even 56Kbps, you could probably read "War and Peace" in the time it takes to change a page. You may prefer downloading a site overnight and reading it at your computer's speed.

■ What's Not. One problem with offline browsers, however, is that some people use them as site rippers. Site rippers swallow all the hard work you put into creating your site and download it to someone else's computer—most often so that person can use it as his or her own work. Some don't even bother to make a few changes. So if you get a feeling of déjà vu when surfing the Internet, you just might be staring at your own site. When this happens, consider it the work of a site ripper.

If you follow Internet trends, you can probably recall a lot of excitement about Virtual Reality Modeling Language (VRML). Do you remember how we were all supposed to be wandering around in virtual-reality environments on all sorts of Web pages? Do you even remember the last time you actually saw a Web page using it? Neither do we. VRML is still at the awkward stage where video games were a decade ago. The graphics seem primitive and jerky. And how many



Streaming audio and video via RealPlayer is extremely popular. It will become even bigger as more bandwidth becomes available.

comments or respond to other notes. These plug-ins create a type of on-the-fly message board. In practice, however, you end up with mostly a hodgepodge of graffiti, spam, juvenile comments, and "don't go there, come here" comments from competitors. Just what the Internet needs: More people that make anonymous comments for which they aren't accountable.

Third Voice significantly slows things down and takes up a chunk of the window space, too. If you elect to turn it off, you have to restart your browser. Maybe it will eventually evolve into something more useful, but for now, it gets a big "not hot" from us. Noss believes companies such as Third Voice must "extend their functionality." The addition of private groups with a limited-access membership is a step in the right direction.

Perhaps the biggest source of complaints we found as we asked about plug-ins and add-ons is Netscape's SmartDownload. It's a good idea because it lets you pause a download or restart one if you are cut off from the Internet. Too many people, however, think it is clunky, unconfigurable, and hard to uninstall. We heard stories from accomplished users of having to root through their Registries to get rid of the problems it caused. Then there is the Netscape promo that users can't close until the download finishes. Until Netscape makes SmartDownload much smarter,

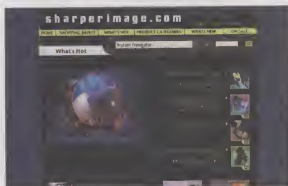
times can you do a panoramic view of a room? Virtual reality is no doubt on the horizon, but it's not ready for prime time, yet.

Commentary plug-ins, such as Third Voice (<http://www.thirdvoice.com>), started out as a good idea. Once you install a commentary plug-in, you can see notes that others leave on a Web page. You can also leave your own

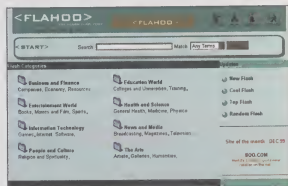
we suggest not installing it. Instead, we recommend GetRight (<http://www.getright.com>), a solid download utility that can manage multiple downloads. It also lets you schedule them for a time when you won't be using the Internet so the downloads won't slow your Web browsing.

■ What's Next. As big bandwidth becomes cheaper and more available and as computers become much faster and more powerful, programs such as RealPlayer should benefit. At a direct dial rate of 56Kbps, the performance of RealPlayer can vary. It often goes into its slide-show mode for us, meaning that video comes in so slowly that RealPlayer shows us a series of still pictures instead of a movie. Using a much faster connection, such as cable modem, streaming audio/video works more as it should. When the Internet's hardware backbone gets smarter about how it routes traffic, it will help to improve streaming audio/video. This will make it more common to look at a movie trailer online before deciding to see it on the big screen.

We've just begun to see the first generation of searchbot programs. These add-ons let you



The SharperImage Web site uses Shockwave to help consumers see exactly how a product looks and works.

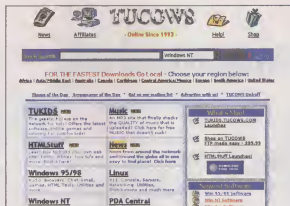


Are you mad about Flash? Flahoo is a search directory of Flash sites on the Internet.

quickly search a pile of sites, and then they give you the results in an orderly fashion. Searchbots are the next logical extension of the present search engines and directories. They will be more highly configurable than search sites, and eventually, smart technology will enable searchbots to predict the kind of responses you would find most useful.

Two searchbots to watch are Copernic (<http://www.copernic.com>) and GuruNet (<http://www.gurunet.com>). Copernic is simply awesome and getting more so each day. You can call on the Web's best search engines and directories to search newsgroups, yellow pages, business sites, encyclopedias, gaming, other file sites, recipe centers, online book stores, image sites, and more. You can even search for the lowest price on hardware and software. When you use Copernic, it updates itself to add more search sites or update older ones. Best of all, it keeps a record of your searches for easy access.

GuruNet is a searchbot that gives you an instant set of reference books for use with Web sites. Don't know the meaning of a word?



Tucows is a terrific Web site for finding plug-ins, add-ons, offline browsers, and other software.

Highlight it, click the GuruNet system-tray icon, and you'll get a rapid return of a definition. There's also a thesaurus and a foreign language translator. GuruNet is fast, much faster than calling on your CD-ROM-based dictionary or searching one of the Internet's reference sites.

Another big event in this coming year involves Flash. Macromedia, according to Hale, is planning to make a major challenge to Adobe Acrobat's PDF file format by includ-

ing the ability to print from Flash. Instead of launching another add-on program, such as Acrobat, Flash will handle it within the browser or send it directly to your printer. For example, if you want to see a company brochure, you'll click a print button, and either that brochure will display on-screen or your printer will print it. Hale sees a big payoff for users as more sites add Flash in that "this integration makes the Web easier to use and makes graphical presentations faster to access." On the Shockwave front, Hale says, "Keep an eye out for multiuser applications, such as chat clients."

As far as offline browsers go, our prediction is that sites will begin to find ways of preventing the wholesale rip-off of their work. At Tucows, Noss believes offline browsers will "continue to be very popular" as a category for the international user. Offline browser authors are working on ways to make their software more flexible to help users zoom in on what they really want to download. **[E]**

by Steve A. Glaser and Elizabeth Lewis

Terms To Know

bandwidth—The capacity a network or data connection has for carrying data. For digital transmission, we measure bandwidth in bits per second (bps); the larger the bandwidth number, the faster the digital transmission. This speed is important for input/output devices because a bus with a low bandwidth could restrain a faster Input/Output (I/O) device from performing at full capacity.

plug-in—A utility that adds to the functionality of another program without changing the main program's base code. Plug-ins allow you to add new capabilities to existing programs without the need for a complete upgrade. Browser plug-ins, such as Macromedia's, allow special animated content to display within the browser itself.

Portable Document Format (PDF)—A file format developed by Adobe that facilitates the conversion of graphics-heavy documents into a form that requires the free Acrobat Reader to read. Creating a PDF file, however, requires the full Acrobat program.

Registry—A database that contains information about user preferences and system configuration in Windows 95, Windows 98, and Windows NT. The Registry contains information about which devices are attached to the computer and which drivers should be used with them. It also keeps track of file associations (which programs should be used to open which type of files) and user preferences, such as what the monitor resolution and Desktop pattern should be.

streaming audio/video—Audio and video content that is transferred over a network and played as the content is downloading rather than after the entire file is downloaded. This gives an impression similar to that of watching television or listening to the radio. To avoid interruptions due to network problems, a few seconds of streaming content is usually buffered on the receiving PC. Unlike sound clips or video files, streaming content is open ended, with no set beginning or end. There are several formats for streaming audio and video, the most common being RealPlayer.

vector-based graphics—Graphics made up of elements such as lines, arcs, and other shapes and created using a set

of mathematical instructions. Vector graphics are formed of lines (rather than dots, such as in bit-mapped graphics) for more flexibility and greater clarity when viewed at higher resolutions. The plug-in Flash uses vector-based graphics.

Virtual Reality Modeling Language (VRML)—A programming language that supports graphical animation of virtual spaces on World Wide Web pages. Detailed three-dimensional images can be created with small programs, allowing the programs to arrive quickly at users' computers and be viewed easily with special VRML browser applications. Links in VRML "worlds" can connect the worlds to other VRML areas on the Web.

Personal Information Managers

Look For More Integration With The Web & Your Other Devices

If you're like most professionals, you're too busy to organize the piles of Post-it notes, business cards, and paper scraps scattered around your desk. And you probably think you need a personal assistant to keep track of your calendar, make sense of your address book, or remind you of upcoming appointments. If this sounds familiar, you may need a personal information manager.

Computer-based personal information managers (PIMs) are applications designed to manage your time and contact database. Unlike human secretaries, they never go on vacation, take sick days, or ask for a raise. PIMs usually include a calendar for scheduling and tracking appointments, an address book for storing names and telephone numbers (the better ones also record e-mail addresses), and a to-do list manager to ensure you complete your important tasks. Often, a built-in alarm system will warn you of scheduling conflicts and upcoming appointments.

When purchasing a PIM, it's best to buy a package that works well with your installed software and hardware. For example, if your office has networked computers, look at GoldMine 4.0 Enterprise Edition (<http://www.goldminesoftware.com>). This robust client/server PIM provides several tools to help local and remote users and workgroups track client names, addresses, and histories while managing scheduled appointments and



other activities. Goldmine 4.0's new features include the ability to exchange and synchronize contact, calendar, and to-do information with Microsoft Outlook, handheld computers that run Windows CE, and other devices. You'll also find more support for Web-based search services, such as WhoWhere and MapQuest, as well as a link to Microsoft Internet Explorer so GoldMine can serve as Explorer's default e-mail client.

If you don't need a network-based, workgroup-scheduling PIM, you may be better off with Symantec ACT! 2000 (<http://www.symantec.com>), a program that works with your installed word processor, fax software, and e-mail program to track contacts and activities and manage scheduling details. Like

GoldMine, the latest version of ACT! maintains a complete history of contact-related communications, including proposals and meeting notes. It also tracks expenses and provides tools to exchange information between your ACT! database on your desktop computer and your handheld computer.

What's Hot. It should come as no surprise that Internet access is a hot topic for PIMs. However, PIMs are also coming with easier ways to share information and even tools to help you work.

Internet connection. With more users relying on the Internet for business communication, your PIM needs to leverage the power of online communications so you can easily find information to update your contact databases, e-mail messages, and other documents.

Don't buy a PIM with little or no Internet support. For example, with ACT! 2000's enhanced Internet integration you can download a free copy of a HotData plug-in, and then run this applet from the ACT! View menu to update area codes in your ACT! contact database. Other Internet links allow you to use Yahoo! People Search to locate addresses, phone numbers, and e-mail addresses for a particular contact; or, you can use Yahoo!'s Driving Directions to get driving directions to a specified address.

You'll want a PIM that allows you to connect to your Internet mail server so you can send and retrieve e-mail without exiting the PIM program. Your PIM should include an automated Web connection for troubleshooting advice and technical support, program patches, product updates, free report templates, and answers to frequently asked questions.

Links to other devices. No PIM is an island. The PIM you buy should be able to link contact data with applications on handheld and palm-sized computers, pagers, and

What's HOT

- Internet/Web integration
- Links to other hardware devices
- Tools for sales and marketing
- Team (workgroup) computing

What's NOT

- PIMs not working with popular programs
- PIMs that don't work with Internet search tools
- PIMs not working with handheld PCs

What's NEXT

- More Internet links
- Tighter integration with existing applications
- Improved tools for sales and marketing

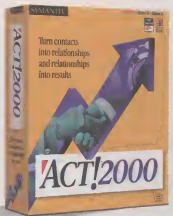
thermal label printers. For example, ACT! 2000 and GoldMine allow you to export information from the PIM database to thermal label printers so you can print one or two labels from your contact list without tying up your printer or wasting sheets of partially used labels.

Additional PIM tools should make it easy to import data from other applications and electronic mailing lists or export data from the PIM database to other applications. It's important that you be able to take your contact manager database with you when you leave the office and easily update the information stored on the office computer when you return.

Tools for sales and marketing. If you have a sales job, you need a contact manager with tools to manage the sales process. Both ACT! 2000 and GoldMine have built-in forecasting and analysis options so you can easily track sales opportunities, products, closing dates, and revenue potential. ACT! has built-in support for the Dale Carnegie training sales methodology, sales training tips, and sales reporting using several customizable templates. GoldMine also features several sales and marketing automation tools, including sales forecasting; leads analysis; templates for customer and prospect tracking and follow-ups; and tools to generate a campaign of letters, faxes, and e-mails that can be sent automatically.

Workgroup collaboration. Users who work in a group or on a team will want a PIM that allows everyone to collaborate by sharing documents over the Internet, corporate intranet, or office network. PIMs designed for operation on a local-area network (LAN) should offer group scheduling, simultaneous file access by multiple users, shared address books, electronic messaging, remote access (so you can call in from a remote location when you want to retrieve messages), appointment updates, and database information.

What's Not. PIMs should be able to work the way you do by providing unlimited opportunities to make you more productive. PIMs that can't easily share data with external



Symantec ACT! 2000

calendar data with Outlook, and even allow Outlook to serve as your Internet e-mail application. At setup, the PIM should automatically install a link to your favorite word processor. ACT! 2000 does this and more. It even includes an Update option that makes it easy to synchronize both ACT! and Outlook calendar data. GoldMine 5.0, which should be out by the time you read this, will be tightly integrated with Microsoft Word and Lotus Notes. It also will be optimized to work with Outlook, letting you manage e-mail messages from your Outlook inbox and synchronize messages, contacts, tasks, and calendar activities. This means you only have to enter contact and scheduling information once. Anything less in a PIM is not worth your effort.

What's Next. Expect more of the same, only better. You'll find improved Internet integration so you can find contact and company information more quickly. You'll also be able to use the Internet for remote synchronization. GoldMine 5.0 promises integrated e-mail that will let you link all e-mail correspondence to customer records. GoldMine 5.0 also will have tools for Web data capture and response, which will enable you to capture information about the people who visit your company's Web site and request information. Automated processes will generate responses to visitors' requests, thereby reducing the need for manual follow-ups.

In addition, PIMs will offer improved sales and marketing tools, including options for sales and quota analyses and features that compare forecasted sales with closed sales. Improved links to handheld and palm-sized computers will provide easy access to contacts and activities when that information is stored in more than one database. Enhanced

devices limit your options. In addition, stay away from PIMs that have few or no Internet connection options hooks to the Internet and those that make it difficult to send e-mail directly from the program. Finally, PIMs that are unable to work with your favorite word processor and e-mail program are useless.

A PIM should be able to import contact data from Microsoft Outlook, share

synchronization tools will ensure the data in both databases are up-to-date. **ES**

by Carol S. Holzberg, Ph.D.

Terms To Know

handheld PC—A powerful mobile PC that fits in your hand. The device typically weighs less than a pound, but it's equipped with a built-in modem for Internet connectivity and e-mail. Handheld PCs that run Windows CE come with "Pocket" versions of Excel, Word, PowerPoint, Outlook, and Internet Explorer to maximize productivity. Other special options enable users to transfer files between a handheld and desktop PC so the PIM information can be updated on each computer.

synchronize—The process of updating a PIM database, calendar, task list, and e-mail information that is stored on a laptop or desktop computer with the new or changed information you entered in the PIM version that is on your handheld or palm-sized computer. Data is updated based on the date and time of the latest change. You can synchronize the data via direct cable connection or remotely by modem, corporate intranet, local-area network, or over the Internet.

Windows CE—A compact and portable 32-bit, Windows-compatible operating system that many mobile computing devices use. Windows CE includes a scaled-down version of Microsoft Internet Explorer, plus support for standard protocols such as Transmission Control Protocol/Internet Protocol (TCP/IP; the language that governs communication on the Internet) and Hypertext Markup Language (HTML; the language in which Web pages are written). It also includes Pocket Word, Pocket Excel, and Pocket PowerPoint so you can transfer files between Microsoft Office applications on your laptop or desktop PC and the Windows CE device.

Desktop PCs

Gigahertz-Speed Processors Lead The Steady Stream Of Rapid Changes

No technology advances at the pace of the desktop computer industry. This becomes clear when we look back to 1975, when the Micro Instrumentation Telemetry Systems' (MITS) Altair 8800 personal computer hit the market. Sold for \$395 (about \$1,200 in 1999 dollars), the first Altair came with then-fledgling Intel's 8080 processor—running at a blazing two megahertz (MHz)—and a whopping 256 bytes of random-access memory (RAM).

Fast forward to the end of 1999. Central processing units (CPUs) are 400 times more powerful. Standard memory has increased to 128MB (megabytes), equivalent to 134,217,728 bytes or 524,288 times the Altair's RAM. Today we can input data with a keyboard, see the resulting output on a full-color high-resolution monitor, and save all that data to a multigigabyte hard drive. These were mere dreams in the Altair era.

If we came this far in under 25 years, the question of where things are headed seems moot. Nobody in 1975 could have predicted how advanced PC technology would become by this time, and there's no way anyone now can conclusively say what wonders will be available in 2025. We do, however, have some idea of how the desktop market will develop in the next few years. In this article we'll discuss what technologies to look for when buying a PC now, which fading technologies to avoid, and what advances to look for in the near future.

■ **What's Hot.** Processors. Few computer components change more dramatically each

year than CPUs. Gordon Moore, one of Intel's co-founders, predicted that processors would double in speed every 18 months, and his law has yet to be broken. In fact, the drive by Advanced Micro Devices (AMD) to gain market share is accelerating processor development. By the end of 1999 competition between



AMD and Intel hit an all-time high, with both companies releasing successively faster processors, ending up in the 800MHz range by year's end. Two of the most-discussed chips are AMD's Athlon and Intel's 64-bit Itanium (previously known as Merced). The good news for consumers is that the arrival of faster processors, which are very expensive, always pushes prices lower for slower processors, most of which are perfect for the majority of PC users.

Faster bus architecture. Improvements in processor speeds, storage device access times, video card capabilities, and other components are for naught if the interfaces they use are not up to task. If a hard drive can internally process 66MB per second but can send only 33MB per second to the rest of the PC, the faster hard drive is pointless. Manufacturers have solved this problem by creating a number of interface technologies that are replacing old standbys.

The front-side bus is one of the main interfaces to keep an eye on, as improvements in this area have speed benefits far out of proportion to the apparent numerical increase. This is because the front-side bus is the critical path the CPU uses to communicate with the computer's RAM. So much data travels through this pipeline that small increases in the MHz rating of the front-side bus add up to enormous speed gains. Current PCs use a 100MHz front-side bus, but new designs incorporate a 133MHz front-side bus. Always try to buy the PC with the highest front-side bus speed you can afford, but be aware that RAM designed for use with 100MHz front-side bus systems is much cheaper than the 133MHz front-side bus RAM.

Developments in port technology languished for years under the domination of the standard serial and parallel ports, but the arrival of Universal Serial Bus (USB) interfaces made this category hot again. The USB standard allows a theoretical limit of 127 devices to be chained to a single port and offers throughput rates up to 12 megabits per second (Mbps). All new PCs come with USB ports, and products such as mice, scanners,

What's HOT

- CPU wars
- AGP 2X
- Ultra ATA/66
- USB

What's NOT

- ISA technology
- CD-ROM drives

What's NEXT

- CPUs running at 1GHz and higher
- SDRAM
- USB 2.0
- The demise of the desktop PC?

and keyboards that connect to these ports are flooding the market.

Another important interface standard found in all mainstream PCs is Accelerated Graphics Port technology (AGP). Prior to AGP, fast video cards relied on Peripheral Component Interconnect (PCI) slots to interface with a PC. PCI is a generic (yet important) interface technology, while AGP was developed with video demands in mind from the ground up. Devices connected to an AGP slot can directly utilize a PC's RAM for temporary data storage, but AGP's biggest benefit is the increased bandwidth it offers. A device using a PCI bus can communicate with the PC at a maximum speed of 133 megabytes per second (MBps), while the lowest-level AGP bus doubles that transfer rate to 266MBps. Most PCs that come with AGP architecture ship with AGP 2X video cards, capable of transferring 533MBps. Obviously AGP is an important technology for speedy three-dimensional (3-D) graphics and for applying more detailed textures throughout an image.

As for PCI, buy a computer that has at least four of these slots, preferably more. Most non-graphics peripherals, such as sound cards, benefit from PCI architecture, as opposed to the older, slower Industry Standard Architecture (ISA) bus.

Better hard drives. Hard drives continue to improve in several areas and rely on increasingly faster interfaces to shuttle data. In the past, the speediest hard drives used advanced versions of Small Computer System Interface (SCSI) technology. The current ultimate in SCSI available to consumers is Wide Ultra2 SCSI, with a maximum data transfer rate of 80MBps. Unfortunately, most SCSI products are relatively expensive, difficult for beginners to configure, and require the use of a separate controller card to work at all.

For these and other reasons, most computers shipped to customers in the last few years have used the AT Attachment (ATA) interface, which requires no extra controller card because the controller is built in to the hard drive. This cuts costs and eases setup hassles, but it also leaves most hard drives with a maximum data transfer rate of 33MBps. Newer PCs use the ATA/66 standard, doubling the bandwidth for data transfers to 66MBps and alleviating one of the biggest bottlenecks affordable PCs traditionally suffered.

When purchasing a PC (or a new hard drive) look for one that takes full advantage of ATA/66. An ATA/66-capable hard drive

connected to a motherboard that doesn't support the technology is restricted to the older 33MBps transfer rate. Contact the manufacturer of your PC (or the PC you plan to buy) to learn whether it can handle ATA/66.

Hard drives also are getting bigger and internally faster. Aside from the interface, look at the rotational speed and capacity statistics when shopping around. The rotational speed is the number of revolutions per minute at which the drive's internal platters spin. A decent hard drive spins at 5,000rpm, but more 7,200rpm drives are hitting the market. 10,000rpm drives are coming down in price and represent the fastest rotational speed most home users will see in the near future. As for capacity, try to get a computer with a 10GB (gigabyte) or larger drive. Current high-end systems we looked at had drives larger than 30GB.

Improved multimedia. 3-D acceleration of any kind used to be an expensive luxury enjoyed only by hard-core gamers. Now every PC comes with some form of 3-D video acceleration. This trend has great side effects whether you play games or not, as the advanced technology that goes into 3-D video cards inevitably improves their 2-D (Windows) performance. When looking at video cards,

audio cards, such as Aureal's Vortex2 SQ2500, can pan sounds 360 degrees around a listener and even simulate vertical positioning, such as a helicopter flying directly overhead. Some use special algorithms that allow these effects with as few as two speakers. These types of 3-D abilities are perfect for games, and current audio hardware supports formats such as Dolby Digital to cater to users who don't play games but still use their PCs as a multimedia center.

Flat displays. Monitors using cathode-ray tubes (CRTs) have dominated the market throughout the PC's existence, but flat-panel displays are finally affordable enough to provide some competition. Currently, the best flat-panel displays within a consumer budget use thin film transistor liquid-crystal display (TFT LCD) technology to provide displays that compete with CRTs in many ways yet take up much less space. The technology is still imperfect, as affordable LCDs produce only a few hundred thousand colors, as opposed to a CRT's millions of colors. New LCD display technologies, such as Hitachi America's Super TFT technology, overcome this liability.

■ **What's Not.** As we mentioned above, ISA technology's heyday is over. The best motherboards on the market have one dedicated ISA slot and a pair of side-by-side slots that you can use for either one more ISA device or an additional PCI card. Considering the number of products that benefit from higher PCI speeds, it makes sense to forego ISA slots when possible.

Modems remain the most popular and simple method of connecting to the Internet, and things are likely to stay that way for a few years. This is unfortunate because alternative connection technologies, such as cable modems and digital subscriber lines (DSL), are tens to hundreds of times faster than a modem connection but are only slowly penetrating the Internet connection market. Be careful of computer deals that involve a discount for a multiyear subscription to a dial-up service provider, as you will still have to pay for that slow connection when you make the inevitable upgrade to a faster technology.

CD-ROM drives will likely be phased out in the next few years. Current CD-ROM technology that uses multiple lasers for reading information to achieve 50-speed (50X, 50 times the speed of original CD-ROM drives) or faster speeds is great, but the higher-capacity DVD-ROM format is here to stay. Look for a computer with a 4X-8X



remember that more memory means more colors are supported at higher resolutions. For users with 17-inch monitors, an 8MB video card should suffice, although a 16MB card is better. Those with larger monitors should consider a 32MB video card.

Audio cards with 3-D acceleration are not as ubiquitous as 3-D video cards, but that doesn't mean the technology is inferior. The best 3-D

DVD-ROM drive to stave off obsolescence. Also remember that DVD "X" numbers are not equivalent to CD-ROM speeds. A 1X DVD-ROM drive spins about as fast as an 8X CD-ROM drive, so multiplying the DVD-ROM drive speed by eight gives an approximation of how it compares to a CD-ROM drive.

■ **What's Next.** About the only things that won't change on a standard desktop PC in the next five years are the letters on the keyboard. Look for processors to move from megahertz speeds into the realm of gigahertz (GHz), capable of executing more than 1 billion commands per second. Manufacturers have already demonstrated chips running at 1 GHz and faster using special cooling techniques, but they will become available to the masses in late 2000. These new chips from Intel (the Itanium) and AMD (code name: SledgeHammer) will incorporate 64-bit architecture, higher bandwidths, and more efficient memory cache designs to elevate computing to a new level. Considering that everything else is getting faster along with the processors (unlike the past where new CPUs were forced to coexist with obsolescent technology), speed gains will really be apparent by the end of 2000.

Customers should benefit in the future from increased competition among CPU manufacturers. We're already seen what a chipmaker such as AMD can do to stir things up, but other companies including IBM and Compaq plan to enter the CPU market in force in the near future. These trends inevitably will lead to CPU speed gains without the exorbitant price premiums we've been living with.

Most manufacturers are working on making PCs instant-on devices like televisions or radios, meaning the startup and peripheral initialization processes will be virtually eliminated. This initiative extends to persistent Internet connections that require no dial-up procedure every time a user demands access.

AGP technology is getting much faster with the introduction of AGP 4X, capable of 1.07GB transfer rates. Some graphics accelerators currently available utilize AGP 4X, but newer cards won't take full advantage of the increased transfer rates until late 2000. Upcoming graphics cards designed for use with AGP 4X will offer stunning 3-D output that puts today's graphic accelerators to shame.

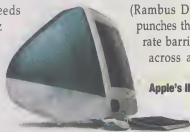
The USB architecture will be replaced by the USB 2.0 standard. USB 2.0 promises several advances, including a target maximum transfer rate of 480Mbps and backward compatibility with legacy USB peripherals.

Advances in RAM technology should be under the What's Hot category at this point, but technological setbacks have kept them here. Users of relatively new PCs are familiar with 100MHz SDRAM (synchronous dynamic RAM), which uses a 100MHz bus to communicate with the rest of the PC. Newer RDRAM (Rambus DRAM) from Rambus, Inc. punches through the 100MHz transfer rate barrier, offering several speeds across a range of prices. At this writing, Dell offered systems with either PC700 RDRAM with a transfer rate of 356MHz, or PC800 RDRAM with a transfer speed of 400MHz. New chipsets, such as Intel's i840, offer dual memory channels, allowing for memory speeds up to 3.2 gigabytes per second (GBps) and ensuring that new memory technologies won't hit a bandwidth ceiling for some time.

Even case designs are destined to change, with more integrated systems similar to Apple's iMac available. As flat-panel display prices come down, their inclusion in integrated PCs will leave more room for other components in an overall smaller amount of space than is possible today. Intel maintains a large collection of possible future designs at its Concept PC Gallery, located at <http://developer.intel.com/technology/easeofuse/conceptpc.htm>. It's impossible to say which of these designs that are as diverse as a jellybean shape and something that resembles the Sydney Opera House will be produced in the future. Be aware that integrated PCs can make upgrading, especially monitor upgrades, more difficult.

Looking into the far future, five to 10 years out, some industry experts predict desktop PCs as we know them will disappear, replaced with a variety of interconnected devices. Instead of using a single PC for playing games, writing letters, and crunching numbers on a spreadsheet, we may have multiple inexpensive devices designed exclusively for one task. Of course, other experts claim desktops are here to stay, so there's no telling what will come to mind when the acronym "PC" is uttered in the future. [E]

by Tracy Baker



Apple's iMac

Terms To Know

Accelerated Graphics Port (AGP)—A technology used to let video cards communicate with the motherboard much faster than was possible with older methods.

Advanced Technology Attachment/66 (ATA/66)—A hard drive interface with a maximum transfer rate of 66 megabytes per second.

cathode-ray tube (CRT)—A display technology found in televisions and most desktop computer monitors.

front-side bus—An important data pipeline that connects the CPU to the system memory.

gigahertz (GHz)—Processor speeds are currently measured in megahertz, or millions of cycles per second. Soon speeds in mass-produced processors will hit the gigahertz mark, equal to 1 billion cycles per second.

Industry Standard Architecture (ISA)—These slots are found on the motherboard and used to connect expansion cards such as modems and sound cards.

Peripheral Component Interconnect (PCI)—Slots used as an interface between an expansion card and the motherboard. They support data transfer rates as high as 133 megabytes per second.

Rambus dynamic random-access memory (RDRAM)—Rambus Inc.'s technology lets memory chips communicate with the CPU at higher rates than is currently possible, speeding overall computer performance.

Universal Serial Bus (USB)—A standardized way to connect external devices to a PC that allows them to transfer data much faster than other ports. USB 2.0, due shortly, will dramatically expand the capabilities of this data pipeline.

Notebook PCs

Computing Power Keeps Coming In Smaller Packages

Not too long ago, buying a notebook PC was easy. If you needed to travel, you bought one, and if you stayed in one place, you didn't. But now that PC usage and notebook PCs themselves have changed, making the decision to own one is not quite as simple.

Notebook PCs don't lag as far behind desktops in the performance race as they once did. Notebook displays are larger and clearer (graphics accelerators are quick, too), processors are almost as fast, hard drives store more, and the memory is comparatively inexpensive. All these factors make buying a notebook a viable option for flexibility in the home as well as on the road, especially when you consider the option of adding a mouse, keyboard, and external monitor for desktop use.

Although notebooks generally cost more than an equivalent desktop PC, there are advantages to owning one, along with some pitfalls, too. It is important to get what you want from the outset, as upgrading can be difficult and expensive.

■ **What's Hot.** If you travel a lot, a notebook's size and weight are important to you. Small, light portable computers are becoming more affordable, making it easier to transport the PC to places you wouldn't take it before. Many of today's manufacturers are reducing the size of their products without removing convenience and usability. The main factors limiting size reductions are the keyboard and the display. If either of these is too small, the notebook becomes harder to use. Some of the newest notebooks are lighter than ever with weights as low as 3 pounds in

traveling form, but 5- to 6-pound notebooks are becoming more common.

If you need a smaller package, turn to the palm-sized PCs that are pushing the size boundaries even more. Palm units are already a huge success, and other handheld PCs, mostly utilizing the Windows CE operating system,



are becoming more common as they become more affordable. Windows CE is designed to provide Windows features in a smaller machine. It is small, so it doesn't require the memory or disk space of Windows 9x or NT, and it has special features, such as built-in synchronization for coordinating files with a desktop or notebook PC. These devices trade the keyboard and mouse for a small screen and penlike device as the favored method of

inputting data. These computers have the processing power of a 4-year-old desktop PC (processors of up to 133 megahertz), but they're suitable for little more than recording short notes and keeping contact information. These devices typically weigh about half a pound, making them small enough to carry in a shirt pocket. A desktop AC unit is normally available for connecting the devices to a constant source of power instead of using batteries, and a supplied cable or infrared connection lets you connect the handheld device to your desktop PC's serial port.

Battery technology is increasing portability, as well as extending the time between charges.

Today's lithium-ion (Li-Ion) batteries can power a PC for five hours or more without a recharge, depending on usage. Li-Ion batteries are considerably smaller and lighter, powering the laptop for longer without sacrificing weight. Also, these new batteries are not subject to the "charging memory" problems that affected nickel-cadmium (Ni-Cad) cells.

Mobile processors are smaller and are designed to generate less heat than those found in desktop PCs because space is limited for heat dissipation. Some notebook PCs have fans to help keep these smaller boxes cool. Intel's recently introduced mobile Pentium III processors have upped the available processing power to 500 megahertz (MHz) and beyond, closing the gap between them and their desktop counterparts. The AMD line of notebook processors includes the K6-II-P and K6-III-P versions at speeds of 475MHz (K6-II) and 450 MHz (K6-III) at the time of this writing.

A major factor in notebook PCs' increasing popularity is the advance in screen technology, and the innovation isn't over yet. The introduction of XGA active-matrix (or TFT) displays and graphics accelerators has led to notebooks with greater resolution (typically 1,024 x 768 pixels), making them more practical. Passive-matrix (dual-scan)

What's HOT

- Slim subnotebooks
- Long-lasting lithium-ion batteries
- Pentium III processors
- Huge hard drives

What's NOT

- Big, heavy notebooks
- Nickel-cadmium batteries
- Dual-scan displays
- Standard diskette drives

What's NEXT

- Longer-lasting batteries
- Flash memory
- DVD-RAM
- Voice recognition

displays are disappearing in all but the cheapest notebook PCs. Active-matrix screen sizes of up to 15.1 inches (diagonal) means that displays are larger than many basic desktop PC monitors.

Handheld and palm-sized PCs use smaller screens, and the addition of color is making them more useable than ever. Although these devices are limited compared to a desktop or even a notebook PC, they can do much more than you would first expect. Software that takes advantage of the color screens makes these displays clearer and easier to understand.

The options available in most notebook PCs are no longer limited to small hard drives and diskette drives as they were just a few years ago. Now, hard drive capacities start at around 4.3 gigabytes (GB) and go beyond 20GB. Some notebooks even have swappable drives so you can add additional storage if needed or keep a couple of different setups for varying uses. Another hot option is the Zip drive, offering 100 or 250 megabytes (MB) of removable disk storage, as well as compatibility with other Zip drives. Instead of the standard diskette drive, some manufacturers offer an LS120 SuperDisk drive, which can access both standard 1.44MB diskettes and a proprietary 120MB disk. This makes it ideal for backing up and transferring data between computers.

Flash memory cards are the hot accessory of the day for handheld and palm-sized computers. These small devices have no moving parts, making them very energy efficient, even though they store much less than a diskette or hard drive. However, the Windows CE operating system is very small and remains resident in the computer, so it doesn't have to be loaded each time you switch on the device. All you need to store on a flash memory card is data, so you really need less storage than you would on a large computer. These small PCs include the ability to link with a desktop machine by serial port, Universal Serial Bus, or even infrared, so you can transfer large amounts of data between them as needed.

What's Not. Large, clunky notebooks are out, which means you no longer need to go to the gym and



Gateway Solo 9300xl

work on your biceps just to move your PC around.

Although dual-scan or passive-matrix displays are cheaper to buy, they're on the way out because they suffer from comparatively poor side visibility (you can see the image only when viewing the screen straight on), higher battery drain, and a dim display.

Battery technology is advancing quickly, so you should avoid anything that comes with a nickel cadmium battery. The older batteries retain a discharge "memory" at the point where they were recharged; recharging a battery that wasn't fully run down would shorten its run time. The newer batteries eliminate the need to completely discharge the battery before connecting an AC supply. This makes the notebook run longer and makes usage much more convenient.

As today's notebook processors close in on desktoplike performance, you can set desktoplike expectations when shopping. If you intend to use your notebook as your main machine, don't buy anything that isn't powerful enough to run the software you need. Avoid anything running slower than about 350MHz or 400MHz. Plan for the future because notebooks are almost

impossible to upgrade economically. Palm and handheld PCs had processor speeds of up to 190MHz at the time of this writing, but they are unlikely to be your main computer, so speed is not quite so vital. The golden rules are to decide what you want the device for, look at future options, and buy the fastest you can afford.

The same rules apply to all aspects of buying computers, especially memory and hard drive space. Don't consider a notebook that has yesterday's allotment of only 16MB of RAM or a 1.2GB hard drive unless it's a real budget model.

What's Next. Two new battery technologies will soon appear in notebook PCs. Lithium ion polymer and lithium sulfur batteries will offer extended run times for notebooks and smaller PCs as they pack as much punch as their larger counterparts currently available. Some can be shaped to take advantage of wasted space in a PC's design, and both will offer 10 or even 12 hours of life between recharges. Intel's new SpeedStep processor technology will further boost battery life by letting processors run at a high speed when plugged into a wall outlet and slow down when running on battery power. At the slower speed, the PC will use significantly less power.



Sony VAIO Z505R

At press time, SpeedStep was set for an early 2000 release.

AMD's strong competition with Intel in both desktop and mobile processors benefits the consumer by forcing manufacturers to produce faster, cheaper PCs. The boost in notebook processing power means that unless they're using the machine for advanced gaming or computationally intensive work, users will increasingly replace desktop PCs with notebooks. This is even more practical when you add a port replicator or a docking station, both of which let you quickly connect the notebook to a monitor, keyboard, and other peripherals that stay in the office.

As the focus of your PC time, a screen's quality is obviously crucial. Any discomfort will cause you to avoid looking at the display, reducing productivity. Active-matrix is much better than its predecessors, and the next generations of displays promise to improve even on that. Gas plasma panels, ferroelectric liquid-crystal displays (FLC), and light-emitting polymers are all being examined as alternatives to current technology. These will enhance image quality and extend battery life.

High-end laptops will increasingly feature DVD (Digital Versatile Disc) drives, offering the ability to read high-capacity DVD-ROM discs as well as CDs and DVD movies. Any traveler will appreciate the ability to watch a movie of their choice while flying instead of watching "Sleepless in Seattle" on a 14-inch screen situated halfway down the cabin. Remember, though, that using a DVD drive drains the battery, so a spare battery is a must for frequent flyers. You can also choose an airline that has AC ports for the passengers' notebooks.

Most current notebooks offer a touchpad pointing device, a small joystick-like device, or both. Smaller devices may use a penlike device on the main screen. You can add text using an on-screen keyboard or even with handwriting recognition. This takes some getting used to and is not really suitable for large amounts of text input. Manufacturers

are looking at new ways to input data using voice and other devices that are quicker and easier to use than a keyboard. Voice recognition is improving all the time, so expect it to become a more common feature in the future. Units like the Sony VAIO C1X PictureBook even let you input photos through a built-in digital camera.

Voice recognition is improving all the time, so expect it to become a more common feature in the future.

■ **The Notebook Way.** The portable PC scene clearly has concerns that are significantly different from anything found in the desktop computer world. Upgrading a portable unit is generally difficult and expensive, so it's critical that you understand upcoming developments so that you can buy a PC that will serve you well into the future. Buy the fastest processor you can afford, bearing in mind that you'll pay a huge premium for a Pentium II or III over a Celeron. Get as much RAM as you can, and

if you don't have to pay too much extra, get larger module sizes (128MB or two 64MB modules). You can upgrade hard drives later, but they will cost more than a standard drive for a desktop. Again, get as much space as you think you'll need for the next few years (much more than you need now).

Be ready to embrace the latest developments, such as flash memory and DVD drives, but make sure your work habits will find the new items as useful as the industry buzz says they are. **LS**

by Tony Kaye

Sony VAIO C1X PictureBook



Terms To Know

active/passive-matrix—Also known as TFT or dual-scan screens. Refers to the method of displaying an image on the screen. The former is much more efficient, both in battery drain and display quality, but is more expensive

AMD—Intel's main competition in the processor war. Responsible for the K6 line of processors and the popular new Athlon processor.

liquid-crystal display (LCD)—A flat, lightweight display technology that uses special molecules in the screen that can twist and turn to create desired images.

lithium ion—A technology used to create lighter, longer-lasting batteries without a "memory effect". Found in all top-end notebooks

nickel-cadmium—A battery technology often used in cheaper notebooks. These batteries are generally larger and heavier than the newer Lithium Ion batteries.

touchpad—An input device in which moving an object, such as your finger, across the pad moves the on-screen pointer.

Universal Serial Bus (USB)—A high-speed, easy-to-use port technology that is becoming the dominant means of connecting peripherals to PCs.

PDA's & Handheld Computers

Better Things Coming In Less-Expensive Packages

In today's fast-paced world, we need more than our brain to keep up with the barrage of appointments, messages, random thoughts, and tasks that beset us around the clock. Personal digital assistants (PDAs) and handheld PCs exist to help us manage this deluge of data, and as life continues to get busier, we will need more organizational tools to help us manage our time.

As prices for truly effective units are dropping to less than \$200, "palmtops" are entering the mainstream consumer market. There will be low-end garbage models from no-name manufacturers, so remember, you get what you pay for.

■ What's Hot. The PDA market has had its share of flops and success stories, so to make sure your next PDA falls into the latter category, let's look at some rising trends.

Wireless. In the 90s, we got used to being able to access the Web and our e-mail from any available PC. Today the object is to surf and send data from anywhere, anytime. Forget the phone jack; mobile sales staff should be able to e-mail the inventory manager while sitting in the client's office. No one can afford to miss a bid opening or quick stock turnaround because of traffic. And think of the benefits of being able to send your spouse a last-minute shopping list, even though you have no idea where he or she is.

3Com's (<http://palm.3com.com>) Palm VII was the first wireless PDA, and the Palm.Net wireless service (available in more than 260 major American cities) is accessible to anyone



who flips up the Palm VII's antenna. Users can access headline news, stock quotes, weather forecasts, sports scores, and their e-mail accounts. Unfortunately, Palm.Net is still a pay-per-use service, just like cellular phone networks.

Those who own older Palm models can establish wireless connections through

vendors such as OmniSky (<http://www.omnisky.com>) and .Novatel Wireless (<http://www.novatelwireless.com>). With these, users clip on a wireless modem just like a traditional Palm modem and dial out on existing North American Cellular Digital Packet Data (CDPD) networks. For Windows CE users, Novatel Wireless also makes a wireless-enabled handheld PC called the CONTACT.

Web clipping. When you are paying by the minute or by the byte for your wireless data, you don't want fancy graphics or other nonessential information. And because your palmtop has a much smaller screen resolution than what you find on your desktop monitor, your wireless Web data will need to be formatted accordingly.

Think of Web clips as distilled snippets of information that are culled from prominent online companies then packaged for you to view on your portable device. As wireless delivery cranks up, this is a bandwagon more and more content providers are jumping on. Because Web clipping is a software issue, it won't affect which PDA you buy, but it will affect whose content you get to read. You can't just surf to CNN's site and have a conventional news report formatted for your PDA. CNN has to design a special version of that story to be viewed by a "microbrowser."

Color. One of the few areas in which WinCE handhelds have leaped ahead of the competition, color displays remain rare because of expensive production costs and huge battery drains. However, this hasn't stopped major vendors such as Compaq (<http://www.compaq.com>) and Hewlett-Packard (<http://www.hp.com>) from shipping very impressive CE-based color PDAs, such as the Aero and Jornada. Color is easier on the eyes for prolonged reading, and it helps you discriminate between tiny on-screen icons. Color screen prices are expected to continue falling, even if battery life remains static.

What's HOT

- Wireless Web and e-mail access
- Web clipping; color displays; e-books
- Keyboards that connect with your PDA to allow faster text input

What's NOT

- Bulky chassis
- On-screen touch-and-type keyboards
- All-in-one designs
- Windows CE on PDAs

What's NEXT

- Scalable architecture
- Longer battery life; foldable displays
- Bluetooth-enabled devices
- More bandwidth for wireless Web surfing

E-books. Whether or not electronic books are feasible, it seems their time has come. Even major vendors, such as Barnes & Noble and Powell's Books, are hyping the Rocket eBook, a paperback-sized dedicated text reader. However, reading an e-mail message on your PDA is one thing; reading the latest Stephen King novel is another. Still, it is possible to read long texts on today's PDAs, and the situation will only improve as display contrast gets better. If you want to see a sample of PDA-based e-books, check out MemoWare (<http://www.memoware.com>) to see one of the largest collections of e-texts available.

Keyboards. Obviously, a full-sized keyboard defeats the space-saving concept of a PDA, but the first-generation of keyboards designed for PDAs has arrived. Think Outside's Stowaway (<http://www.thinkoutside.com>) and Landware's GoType! (<http://www.landware.com>) are light and compact, particularly the Stowaway, which actually folds up to fit in the palm of your hand. Having a keyboard makes your PDA far more practical for writing memos or extended outlines.

■ **What's Not.** For all the great innovations PDAs and handhelds have spawned, remember these are still fairly new products. As a result, some ideas never caught on or are on their way out.

Bulky chassis. Thin is in. PDAs need to make the transition from jacket pockets to shirt pockets and avoid looking like a pacemaker implant in the process. The Palm V and Compaq Aero are good starts, but there is still a lot of room for improvement. Bulk is also why those smart phone/PDA hybrids, such as Qualcomm's pdQ (<http://www.qualcomm.com>), are destined for obscurity.

On-screen keyboards. For anything longer than a short sentence, on-screen keyboards, which require users to tap icons little larger than a pinhead, are incredibly annoying. To be practical, PDAs need good handwriting-recognition firmware.

All-in-one devices. It's a PDA, a cell phone, a pager, a camera, and it still slices through a tomato! The idea of constructing a single gadget to replace many gadgets makes sense from the standpoint that you're only buying (and carrying) one device instead of several. Unfortunately, there are inevitable trade-offs. More features usually means more size, which is a step backward in this market.



Compaq Aero 2130



Rocket eBook

Also, the PalmPilot proved years ago that it's more important to do a few things extremely well than to do a mediocre job of everything. Low-end users may find all-in-one PDAs useful in some circumstances, but the poorer quality will keep such units out of professional markets.

Windows CE. Windows justifiably continues to thrive in the server and desktop spaces, and WinCE stands to do well in consumer devices such as television set-top boxes. However, Palm Computing commands more than 75% of the PDA market, while WinCE clings to only 13%. In addition, major manufacturers, such as Philips and Everex, are abandoning the platform. Consequently, it looks like WinCE and PDAs are incompatible on the popular market. Microsoft may still become a

dominant player in the PDA field, but it may have to jettison the Windows name and interface to do it.

A hint of WinCE's ultimate fate comes from Microsoft representative Nikki Mundie. "The Windows CE operating system remains an important part of the device and the overall experience, but it won't be something we call out separately," she says. "Instead, because users do want the affinity with Windows and the attributes that brings to the experience, we are moving in a direction to simplify the overall brand to 'Windows powered' and focus the consumer on the broader attributes that this brings."

If Windows can be tweaked to scale across multiple device platforms, moving to a "Windows-powered" concept makes sense. But today's Windows CE and desktop Windows are not directly compatible without awkward data conduits. Until they are (and until WinCE ditches its absurd Start button interface), Windows will continue to fight a losing battle here.

■ **What's Next.** You can expect more functionality out of your wee machines in the near future because handheld computing is moving from a curiosity to a practicality. More memory and battery life are making more things possible in the ultraportable realm. Be on the lookout for the following innovations.

Scalable devices. Another ramification of "Windows powered" is that users may someday have one device suitable for any operating environment. At a lunch appointment, it looks and acts like a PDA, while back at the office it becomes one active component in the user's computing system. This would eliminate the constant hassle of remembering to synchronize the device with a desktop PC because, in a sense, the PDA would be an integral, modular part of the PC.

"What the user wants is something that scales from being a handheld device to being something that has full productivity capability at the office," says Rob Enderle, vice president of desktop and mobile technology with Giga Information Group. "We're just waiting for the appropriate device to hit the market. The most likely platforms today, of course, are the Palm Platform and CE, but it's probably going to be something we haven't seen yet, primarily because users are asking for something that is extensible, not separate [from the desktop]. We probably need to

start over from scratch with something designed to do this."

Battery life. Although manufacturers have tried alternatives, lithium-ion technology remains the top battery choice because of its size and performance. Unfortunately, the energy density in today's lithium-ion cells is near the theoretical limit. An entirely new battery technology must be developed to take us to the next level and enable color PDAs to run for a month on one charge. One possibility is "fuel cell" technology, which extracts energy from hydrogen. Methanol-based fuel cells deliver 16 times the energy of conventional lithium-ion. We may not see fuel cells small enough for PDAs in this decade, but the ultimate prospects appear good.

Bluetooth. Bluetooth is a wireless standard that can connect peripherals, such as printers and scanners, to desktop computers. This 2.4 gigahertz (GHz) wireless radio technology will make its public debut later this year and may appear in PDAs in 2001.

When placed within 30 feet of each other, Bluetooth-enabled devices communicate and form an ad hoc network, transmitting data at up to 720 kilobits per second (Kbps). This means no more docking cradles, no more infrared beaming, and no more need for clip-on Global Positioning System (GPS) modules. Already, JP Systems (<http://www.jp-systems.com>) has announced plans for its Blue-Connect module, which will provide Bluetooth functionality to Handspring Visor PDAs (<http://www.handspring.com>).

Bandwidth. As soon as mobile modems can inexpensively transfer data faster than 19.2Kbps, we'll see the end of Web clipping. Even just doubling this rate would enable acceptable graphics-based Web access (although screen resolution is another matter). However, being able to receive such data feeds outside of urban centers will require a comprehensive global satellite system such as Teledesic's self-described "Internet-in-the-sky" network (<http://www.teledesic.com>).


CompactFlash cards. You may want more features for you PDA, such as more RAM or the ability to play six hours of MP3 files, but you may not want those extra features permanently attached to your unit. CompactFlash cards, a common memory staple in the digital camera market, can provide such a solution for PDAs. Present CompactFlash solutions include wired and

wireless modems, network adapters, GPS modules, barcode readers, and even 160MB or 340MB hard drives based on IBM's Microdrive technology.

Foldable displays. Yes, as in take a big display, fold it up, and slip it in your pocket. According to Giga's Rob Enderle, Philips has even produced a prototype. "Electronic paper" has been a favorite pursuit at research giants such as Xerox, Lucent, and IBM for years. In recent months, IBM researchers published their findings in *Science* magazine relating the creation of a thin flexible transistor that could ultimately be used to "spray" a screen on to a flexible substrate and replace glass-based liquid-crystal display (LCD) screens.

Now, if you happen to be one of those people who thinks all of this next-generation stuff is just toys and gadgetry for the rich, you may be right. The first generations of PalmPilots, which had less than half a megabyte of memory, could store only a few hundred calendar events, notes, and addresses. There was very little room for third-party software, let alone clip-on hardware modules. But for people who used (and continue to use) PDAs as simple organizers, the old PalmPilots did the job perfectly. More RAM, faster processors, wireless input/output systems, and all the rest don't make an ounce of difference.

Does that mean you should buy an old \$50 PalmPilot out of the classified ads instead of going to the computer store to buy a brand-new PDA? Only if you're the kind of person who can still get by running a 386-based PC because all you do is use the word processor and play Solitaire. Today's PDAs offer a great deal of computing power in a very small package. In the near future, we can expect more of the same.

It's a fact of life that we buy a technology to do this, but we wind up also using it for a lot of that. The more functions a PDA or handheld computer can perform competently, the more ways you'll discover to integrate it into your lifestyle. 

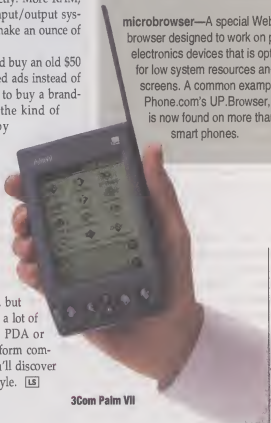
by William Van Winkle

Terms To Know

2.4GHz—In the world of consumer devices that communicate through radio waves, most function on the 900 megahertz (MHz; 1 million cycles per second) band, especially today's wireless telephones. The 2.4 gigahertz (GHz; 1 billion cycles per second) range is a license-free alternative that allows for faster data rates. However, on this frequency there is the possibility of interference with microwave ovens. To compensate, most 2.4GHz devices, such as Bluetooth-enabled devices, use "frequency hopping" or "spread spectrum" technologies, which quickly bounce signals through different frequency levels to minimize interference.

conduit—Software designed to translate and pass data between desktop and handheld applications. For instance, Starfish's TrueSync software (<http://www.starfish.com>) provides conduits that link Microsoft Outlook, Yahoo! Calendar, and PalmPilot devices.

microbrowser—A special Web browser designed to work on portable electronics devices that is optimized for low system resources and small screens. A common example is Phone.com's UP.Browser, which is now found on more than 20 smart phones.



3Com Palm VII

BOSE

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Processors

Cooler, Smaller & Faster In Record Time

PC manufacturers seem to have a mantra. We hear it's "Faster, better, cheaper." It particularly applies to the makers of the brain of a computer, which is known as the central processing unit (CPU). The two main processor manufacturers are Intel and Advanced Micro Devices (AMD), and their rivalry is spurring announcements almost every month. Processors are speeding up, slimming down, gaining memory, and getting cheaper all the time.

For this reason, more processors are in the "What's Hot" than in the "What's Not" category. PCs are getting faster, better, and cheaper because PC processors are doing likewise. When you hear about computers in your walls, clothes, and body, people are talking about processors small and powerful enough to do things that were previously impossible. With that in mind, here are some trends in PC processing.

■ **What's Hot. Speed.** In the processor world, everyone is competing to be the fastest. AMD announced an 800MHz Athlon processor in January in response to Intel's 800 MHz Pentium III processor, which was announced on December 20, 1999. Both have said they intend to reach one gigahertz (GHz) by the end of 2000. Some industry analysts think that AMD may even get their 1 GHz processor out by the summer.

In 1999 a company called Kryotech managed to run an Athlon at 1 GHz. It accomplished this by supercooling the processor with an advanced compressor to reduce excess heat. But the Holy Grail, says Kevin Krewell, an analyst at MicroDesign Resources (MDR), is to attain one GHz with an air-cooled processor.

Clock speeds. Today, even home users want superior performance and clock speeds for 3D gaming, entertainment software, and the Internet. "Frequency is the tide that lifts all boats," according to one AMD presentation. As processors rev up the other



components must improve to keep up with them.

While many applications don't need sheer speed, the rising-tide effect makes performance something to watch. Also developing rapidly is the processor's internal architecture. Processors are using sophisticated techniques to do operations in parallel. Long gone is the era when computers executed one command at a time in sequence on a series of punch cards.

To gain a better understanding of the technology behind CPUs, imagine the processor reading several instructions into memory. It scans for tasks such as calculations and hands off the ones it finds to be processed separately. If it encounters a statement with two possible outcomes, it predicts the likeliest outcome and tackles that first.

Taking on several commands at once is called superscaling. Breaking them into several parts is called superpipelining. As an example of a superpipelined microarchitecture, AMD's Athlon has nine executable pipelines: three for address calculations, three for integer calculations, and three for floating point and other calculations.

Related to parallel processing is the use of Single Instruction, Multiple Data (SIMD) techniques. SIMD is an evolution of MMX technology, which Intel introduced a couple of years ago. By improving the PC's computational capabilities, manufacturers deliver better audio and video in multimedia applications and on the Internet.

Both Intel and AMD are adding SIMD instructions and enhancing MMX. Intel bundles this technology under the name Streaming SIMD Extensions (SSE) and AMD calls it 3DNow!, but the idea is similar. Both companies aim to add as much functionality as possible in the fewest number of instructions since each instruction takes time to execute.

Bottlenecks. In PC processing one of every three operations involves memory, so access to system's random access memory (RAM) is a huge bottleneck. Manufacturers get around this by placing memory caches near the processor. When the processor fetches a block of code, it puts it in a nearby cache. If the processor finds the instructions it needs in the cache next time, it proceeds. If not, it queries the RAM again.

Typically a processor has a first-level cache (L1) built onto the chip and a second-level cache (L2) nearby connected with a bus. Intel and AMD use different cache configurations

What's HOT

- Faster clock speeds
- SIMD (SSE, 3DNow!)
- More cache

What's NOT

- Low-end processors with low performance
- Integrated 3-D graphics
- Intel's processor serial number

What's NEXT

- 64-bit processing and architecture wars
- Smaller and faster processors
- Convergence and commoditization

on their processors, but both are improving the caches constantly. The trend is to increase the cache size, put more cache on the die with the processor, and run the cache at the processor's clock speed. AMD's TriLevel Cache design even offers an optional Level 3 (L3) cache.

The processor's fetches to RAM are slow because the system bus (the channel between the CPU and RAM) is slow. A typical system bus can convey 64 bits (eight bytes) at a time at 100 MHz, or a peak of 800 MB per second. Buses haven't edged much beyond 133 MHz, though the Athlon has a 200-MHz front-side bus (FSB) and AMD has proposed a 266-MHz FSB.

System buses have several channels for data transfer, so a processor can send another request before it gets the results of the last one. New buses will allow split and out-of-order transactions. In the latter case, the processor will make requests in any order and match the responses when they arrive. It won't have to do jobs sequentially anymore.

Manufacturing. There are some of the improvements to note, but none of them come free. The "cascade of tricks," as one writer put it, will require more transistors, longer signal paths, and larger chips. That means a more elaborate production process and a greater chance of defects. In other words, more expense.

That's why progress in manufacturing methods is important. The industry is moving from 0.25-micron to 0.18-micron technology and from aluminum to copper circuitry.

The 0.18-micron standard refers to the width of the wires between transistors; narrower pathways let more circuits fit on a chip. Copper's advantage is that it's a better conductor of electricity. More data can flow through it in a given amount of time and space. Together these developments will make chips faster, cooler, more energy-efficient, and cheaper to manufacture. Intel is already putting 28 million transistors on its Pentium IIIs with 0.18-micron technology. AMD is using similar methods to produce its Athlons and plans to use them for its K6-2+ line this year.

There is one caveat worth noting. Processor and system vendors have persuaded consumers that speed is the only thing that matters. This is not the case.



AMD's 800 MHz Athlon

Speed does matter, but two machines with the same megahertz can produce widely varying results. Factors such as parallel processing, on-chip caches, and graphics enhancements cause these variations. Most people can't test these features individually, but they should be made aware of them. Don't just buy the model with the biggest numbers. Do your homework; read reviews in *Smart Computing* and other magazines and see what the experts say about performance.

Mobile computers show similar tendencies; this is especially the case where miniaturization is concerned. One difference is the need for less power consumption. In upcoming notebook technology, such as Intel's Geyserville and AMD's Gemini, the system will be able to slow the processor and reduce its voltage when it's running from the battery. That will conserve the unit's power and prolong its operating life. However, the system will run at desktop system speeds when plugged into a power outlet.

■ **What's Not.** Although processors provide more bang for the buck than ever, the market for inexpensive versions is curiously

tame. The days when most people needed only a basic computer for word processing and spreadsheets are past. Even casual users are demanding power for advanced gaming, multimedia, and Internet functions.

Less powerful processors. Perhaps that is why the demand for low-end processing has ebbed.

Clock speeds less than 400 MHz and 500 MHz are becoming passé. Why buy a processor barely able to cope with applications when a more potent one is affordable? Manufacturers such as Cyrix and IDT's Centaur group have suffered because of this trend. Furthermore, Intel has released upgrades of its low-end Celeron processor and has aggressively cut prices. All this has made it hard for cost-conscious companies to compete.

Via Technologies has bought Cyrix and Centaur and hopes to revitalize them using their best assets. It faces several obstacles; this includes feuds over patent rights and fierce competition from Intel and AMD. Until it proves itself, Via's prospects in the CPU market remain uncertain.

Intel also had some difficulties when rolling out its Coppermine Pentiums based on 0.18-micron technology. The glitches affected only a small percent of these processors, but they forced Intel to delay its Coppermine release announcement from summer to fall.

MMX. Another technology that's no longer hot is Intel's MMX instruction set, which enhances integer calculations and data movement. MMX was a buzzword when it appeared. It was a technical term that Intel marketed heavily and everyone thought they had to have. In the end, however, it didn't have much of an impact.

Advanced Graphics Port (AGP). Like MMX, the Accelerated Graphics Port (AGP) was another hot item that fizzled. AGP is a high-bandwidth fast lane for graphics data, but few programs take advantage of its benefits. Systems are appearing with AGP4X (four times the speed of the original AGP), but some fast games don't even utilize AGP2X.

Integrated 3D. A related issue is 3D graphics. Intel has integrated 3D graphics into its mainstream chip sets, the 810 and 810e. The integrated approach is itself dubious. With their higher bandwidth, graphics



AMD's K6-III processor

accelerators can render 3D graphics faster than integrated circuits can. But computer buyers care "only about megahertz, not actual performance," says Linley Gwennap of MicroDesign Resources. Personal and business users don't run many 3D applications and don't realize what they're missing.

CPU ID. One area that's definitely not sizing is the Pentium's processor serial number. Intel claims this ID number is there to help information technology (IT) departments manage their systems. The number was supposed to aid e-commerce, protect digital content, and prevent counterfeiting and theft.



Intel's Pentium III processor



Intel's Pentium III Xeon processor

However, when Intel announced its last year, industry pundits noted that remote operators could use it to track systems across the Internet regardless of whether they were stolen. Worse, malicious users could steal an ID number and fleece online merchants with it. Though corporations may appreciate the processor serial number, it offers no clear benefits to most consumers, small business, and home offices.

■ **What's Next.** In the near future AMD's Athlon processor will be "literally and figuratively hot," says MDR's Kevin Krewell. It will hold the high ground until Intel premieres its Willamette processor, the next generation of 32-bit processor in the x86 family, in 2000. As the successor to Intel's Pentium III Xeon, this processor may possibly carry the Pentium IV designation.

AMD will respond with its K75 processors, which are codenamed Thunderbird and Spitfire and made using 0.18-micron technology. 2001 is expected to usher in AMD's Sledgehammer. This is an eighth-generation, 64-bit processor based on the x86 architecture. Meanwhile, Intel will perfect its 64-bit processor using a novel architecture known as IA-64 or Itanium.

Understandably, companies won't reveal their future plans because of the fierce competition. However, some trends should continue. Among these are speed, miniaturization, convergence, and commoditization. MDR's Linley Gwennap claims each generation of processor roughly doubles the performance of the previous one. Whether the Athlon or Itanium is the first seventh-generation processor, people can expect more iterations during the next few years. If the pattern persists, processors may race at 8 GHz or faster by 2010.

As Intel and AMD move to 0.18-micron processes, they're beginning to talk about whether 0.13- or 0.10-micron wiring will follow. Etching these paths will require an ultraviolet (UV) light with an extremely narrow wavelength. Further reductions may call for electron beams rather than UV light.

These developments will make computers smaller and faster than ever. Simple processors will show up in wristwatches, eyeglasses, and hearing aids. More robust ones will begin the evolution of today's limited handheld devices into Star Trek's all-purpose tricorder.

Another trend to note is convergence. Note that the computer is already the tool of choice for editing audio or video materials. Soon all content will be digital and physical media will fade away. Multimedia signals will arrive on a TV-like computer and be saved for playback. PCs will merge with equipment such as televisions, Web-based terminals, video-game consoles, digital audio and video recorders, and telephone answering machines.

Tied to this is the commoditization of processors. Though the Big Two control the

Terms To Know

cache—Small, fast areas of memory near the processor where frequently-used instructions are kept.

clock speed—The number of cycles a processor performs in the span of one cycle of the computer's system clock. Measured in megahertz (MHz), or millions of cycles per second.

pipelining—A processor's ability to read a new instruction from memory before it finishes processing the current instruction.

processor—A self-contained chip or unit that either does or controls a system's data processing. Also known as the microprocessor or central processing unit (CPU).

Single Instruction, Multiple Data (SIMD)—Processing technique that applies one command to several data items within a clock cycle.

Superscaling—Processor's ability to execute several sets of instructions at the same time.

system bus—Set of conducting wires or conduits that transport data from the processor's core to other components.

PC market, manufacturers are embedding intelligence in everything from TVs to telephones to game stations. Because of the ubiquity of these platforms compared to PCs, embedded processors should predominate. Peter N. Glaskowsky of MicroDesign Resources believes television "will take on an even greater role in the next decade," rendering cheap computers obsolete. "PCs will continue to sell to business buyers and home PC enthusiasts," says Glaskowsky, but they'll be a small part of the customer base. Most processors will come from vendors like Sony or Nintendo.

A world without Intel inside? Stay tuned for further developments. **16**

by Robert V. Schmidt

Monitors

The More Things Change, The More They Remain The Same

Of all the components that constitute a modern PC, few have evolved as slowly as display technology. Compare the components of a computer sold in 1995 to those sold in 2000, and this is immediately apparent. In five years, standard hard drive sizes have increased from one gigabyte (GB) to 10GB or more. Top processor speeds have jumped from 166 megahertz (MHz) to 800MHz. The standard amount of random-access memory (RAM) in 1995 was four megabytes (MB) to 8MB and has since jumped to 64MB to 128MB.

And monitors? A system purchased in 1995 typically came with a 15-inch cathode-ray tube (CRT) monitor with a recommended resolution of 800 x 600 pixels. The standard now (at a comparable price) is a 17-inch CRT monitor with a recommended resolution of 1,024 x 768 pixels. Prices have gradually eroded, but monitors have yet to experience the dramatic price reductions other PC components have seen. Considering that conventional CRTs have been in use for over 100 years, if display technology progressed at the rate of, say, video processors, we'd all have personal holodecks by now.

Display technology is incredibly complicated, making revolutionary changes slow and adding much time and expense to the manufacturing process. The slow transition from analog to digital technology has curtailed progress. These obstacles combine to create perhaps the biggest problem of all: the prohibitive cost of new display technologies. Despite all of this, nothing is stopping companies from innovating new display technologies. This article explores what's

available, what you should avoid, and what you should look for in the future.

■ **What's Hot.** Short-neck CRTs. Most desktop PCs sold use CRT displays, and it's likely to remain that way for a few years. CRTs work like televisions but are much more precise. A CRT is a glass structure shaped like a funnel that contains a vacuum. The small end of the funnel houses one or more electron guns that



shoot streams of electrons to the large end of the tube. This large end is covered with red, green, and blue phosphors that glow when hit with electrons. The combinations, glowing at different intensities, produce the images.

CRTs are relatively inexpensive for the screen sizes they provide. Good 21-inch CRT

monitors are available for considerably less than \$1,000, while all the comparable liquid-crystal displays (LCDs) we looked at (17-inches to 19-inches) start at \$2,000 and rocket into the \$4,000 plus range. Because CRTs emit light, they are much brighter than competing products that rely on transmittance, such as LCDs.

CRTs can produce color at 24-bit to 32-bit depths. Color reproduction is one failing of most flat-panel technologies. Finally, monitors with CRTs can work at multiple resolutions without distorting images. They have no "native" resolution, as most flat-panel products do.

CRT displays may not be cutting-edge anymore, but that means they are also cheaper than displays using competing technologies. Chances are good that you'll purchase a traditional CRT display if you buy a monitor in the next year or two, and there are many features to look for when comparison shopping.

Definitely purchase a monitor with a screen size of 17-inches or greater. You'll find 19-inch to 21-inch displays are increasingly affordable and work wonderfully with current video cards. To save space, consider a short-neck CRT. These displays reorganize internal components so the electron gun is nearer the screen, reducing the monitor's depth. Unfortunately, current short-neck designs have focus problems caused by the increased angle from the electron gun to the edges of the screen. Most manufacturers will be able to solve all these problems in the next year, so don't dismiss short-neck displays as a possibility until you've looked at one.

Look for a CRT that handles a high refresh rate at the resolution and color depth you want to work with. The refresh rate is the number of times per second an entire screen of information is drawn, and it is listed in hertz (Hz). Refresh rates of 60Hz or lower cause noticeable flicker in an image, and some people are bothered by flicker all the way up to 75Hz. Buy a CRT display capable of 75Hz refresh rates or higher at the resolutions you use and make certain your video card supports

What's HOT

- Flat-panel displays
- Pure digital output
- Short-neck CRTs

What's NOT

- Standard CRTs
- Analog technology
- Displays smaller than 17 inches diagonally

What's NEXT

- Improved flat-panel technology
- 3-D displays
- Print-quality dpi

those rates. Also keep in mind that the benefits from anything higher than 100Hz (even 80Hz for most people) are purely academic, unless you hail from another solar system.

Flat-panel Displays. Although not an immediate threat to the installed base of CRT monitors, displays using flat-panel technology are poised to take over. Consumers looking for a flat-panel display in the past could only purchase devices using LCD technology, which has some severe limitations compared to CRT technology. Other options have emerged, but LCDs are the only affordable consumer-level flat-panel devices at this point.

LCDs have been around for over thirty years, starting as monochrome displays and ending up as the color devices found in all notebook computers today. LCDs use a different method than CRTs to display images. On a most basic level, LCDs sandwich liquid crystals between two layers of glass and some polarizing filters. This panel is backlit by fluorescent tubes, and voltage applied to the liquid crystals causes them to rearrange themselves, allowing discrete amounts of light to pass or preventing light from passing at all. Improvements to LCDs have appeared steadily, and perhaps the most widely known is the introduction of thin film transistor (TFT) technology to the sandwich. In a TFT display, also known as an active-matrix display, each individual pixel has its own transistor controlling the voltage, giving the entire unit response times fast enough to support full-motion video.

Flat-panel displays, like LCDs, are small in terms of depth. A 21-inch CRT is nearly 2 feet deep, whereas a flat-panel monitor with a comparable screen area usually is less than 2 inches deep. Displays using new and emerging technology are even thinner; some can be rolled up or bent without damaging anything.

The smaller sizes are nice, but perhaps the biggest benefit of flat-panel displays is their digital architecture. Standard CRTs are analog devices and are prone to signal degradation when the digital signal from the computer has to be converted into an analog signal the monitor can understand. All components of a traditional CRT can contribute to inaccuracies when rendering video, making them frustrating for professionals who

This image, taken from the screen of a 6.3-inch Toshiba display, achieves a native resolution of 1,024 x 768 using LTPS technology.



need consistent colors or a distortion-free environment for drawing.

Digital displays eliminate the analog conversion and are capable of producing stunningly consistent images. A designer who applies an exact shade of red in an imaging program will get that precise shade every time when the video card sends digital signals to a digital monitor with no analog conversions.

■ **What's Not.** Standard CRTs. Current display technologies have all sorts of built-in drawbacks of which buyers should be aware. Traditional CRTs are very deep because there has to be a certain amount of room for the electrons to maneuver. Because of this and the heavy components used in CRT construction, this type of display is known for its bulkiness and weight. CRTs also consume a lot of energy.

Electron beams trade accuracy for power. Highly focused, accurate beams contain a relatively small number of electrons, meaning the phosphors they excite cannot achieve full brightness. A larger beam with more electrons can really get the phosphors to glow, but the bigger beam has the chance of interfering with

nearly phosphors, causing unintentional display degradation. To compensate, all current CRTs use a grid of metal generically called a mask to block extraneous electrons.

Several types of masks are in use. The most prevalent, called a shadow mask, is used when phosphors are arranged in a triangular pattern (one red, one green, and one blue phosphor per triangle). Each phosphor is surrounded by shadow mask metal that deflects stray electrons. Imagine a sheet of metal with a hole punched out for each phosphor and then

affixed to the phosphor coating, and that's the shadow mask. It sometimes is possible to see the outline of the shadow mask with your naked eye; it always shows up when the screen is viewed through a magnifying glass. This means that CRTs eventually will be surpassed by flat-panel displays in terms of brightness and the amount of detail that can possibly be displayed.

Manufacturers have made several efforts to improve CRT masks, reducing their size, which allows more light to be emitted from the monitor. A popular variant is Sony's Trinitron technology, which uses vertical stripes instead of triangles to arrange phosphors. This eliminates the need for horizontal masking, reducing the overall amount of masking material and making for a brighter image. When shopping for a monitor, ask what type of mask is used and how it compares to the shadow mask standard in terms of the amount of phosphors it blocks.

Flat-panel displays. Flat-panel displays, especially LCDs, aren't perfect either. Several flat-panel displays are available, but some are destined to lose their value faster than others. We generally recommend avoiding older double-layer supertwisted nematic (DSTN) LCDs, because they are inferior to TFT LCDs, especially in terms of brightness and response time. Anyone who has seen a mouse cursor move across a DSTN display, leaving a trail of ghost cursors in its wake, has witnessed the latter. DSTN displays are relatively cheap and work well for simple tasks such as word processing.

Old CRT analog technology has prevented flat-panel displays from being fully used because an overwhelming majority of video cards offer only analog output. Most LCDs have a built-in converter. If you are considering a flat-panel display, plan



to buy a new video card with digital output and make sure your new flat-panel monitor can use the pure digital signal.

Color reproduction is another problem that plagues flat-panels. Older flat-panels simulate only a few hundred thousand colors. We're seeing developments, such as Hitachi's Super TFT (STFT), that use an algorithm to let each pixel simulate one of 253 shades of color for over 16 million colors from a TFT LCD.

We mentioned that most flat-panels have native resolutions. An LCD designed to work at a resolution of 1,024 x 768 pixels will not work at a higher resolution because there aren't enough pixels to produce bigger images. At smaller resolutions, such as 800 x 600 pixels, LCDs do one of two things. Sometimes the smaller image is displayed in the middle of the screen, with the extra pixels at the edges remaining dark, or the image is scaled to fill the entire display, but this leads to ugly, jagged edges and nearly illegible text. Definitely purchase a CRT display if you plan to use several screen resolutions.

■ What's Next. New display technologies are released slowly, but things are bound to get better in the next few years. CRTs continue to evolve, with products such as Candescent Technologies' ThinCRT redefining the way we think about this antique technology. ThinCRT products can be less than an inch thick and use a different type of cathode technology to consume much less power than a traditional CRT. The devices support 24-bit color and prove that CRTs can compete with the flat-panel displays.

The popularity and importance of flat-panel technology has led to a number of interesting designs that should be rolled out in the near future at prices average customers can afford. Toshiba is mulling out a line of displays using low-temperature poly-silicon (LTPS) technology. LTPS dispenses with many of the components that older technologies such as TFT rely on, resulting in extremely thin designs that consume little energy yet offer incredibly bright contrast ratios. The reduction in components also means the LTPS displays should prove more rugged than older technologies.

Watch for flat-panel products that either emit or reflect light on a per-pixel basis instead of requiring constant backlighting. Light-emitting polymer (LEP) displays being developed by Hewlett-Packard and Cambridge Display Technology are a good example. They use polymers that glow when a current is applied, giving them the size advantages of LCDs and the light-emitting properties of a CRT.

A few imminent technological breakthroughs apply to both CRTs and flat-panel displays. For example, a low number of dots per inch (dpi) has hampered all forms of display technology for quite awhile, but steps are being taken to amend this. Current displays have 72 to 100dpi (or pixels per inch), which is far fewer than the 300 to 600dpi of a print magazine. IBM has announced a display from its Monet project with 200dpi, and this number will increase over the years. More dots means more detail because finer lines can be drawn. Unfortunately, increasing a monitor's dpi calls for incredibly powerful graphics accelerators that can feed a staggering amount of video information to the monitor. Whether graphics cards can keep pace with increasing dpi demands remains to be seen.

Beyond advances in 2-D display technology, the real revolution will come when 3-D

displays are perfected. Several companies are working on 3-D displays, and VisuaLABS, for one, is having much success. The developing technology doesn't rely on stereoscopic tricks to render static or dynamic 3-D images; instead it generates 3-D pixels that can be perceived as such, even with one eye closed. Read all about this exciting development at the VisuaLABS Web site (<http://www.visualabs.com>).

It's impossible to predict standard display technology in the future. It could range from wall-sized flat-panel displays to stereoscopic glasses that obviate the need for a desktop monitor. We could see 3-D projection systems and electronic books with paper-thin color displays. In any case, that bulky glowing box on your desk won't reign for another century. **[E]**

by Tracy Baker

Terms To Know

cathode-ray tube (CRT)—A funnel-shaped vacuum tube that uses an electron beam to excite colored phosphors and cause them to glow.

color depth (bit depth)—Measured in bits, which is why it sometimes is called bit depth, the color depth determines the maximum number of colors a display can produce or simulate. A display capable of 24-bit color can produce a number of colors equal to two to the 24th power, or 16,777,216 colors. Most LCDs display 18-bit color, equaling a relatively puny 262,144 distinct colors.

dots per inch (dpi)—Sometimes referred to as pixels per inch (ppi), this is the number of individual pixels contained in a square inch of display area. A value of one dpi would correspond to only one pixel per inch, so higher values mean more detail is possible.

double-layer supertwist nematic (DSTN)—An older LCD technology that is falling out of fashion as TFT LCD prices tumble. DSTN LCDs respond slowly to voltage fluctua-

tions, making them unsuitable for certain applications, such as full-motion video, that require fast video updates.

light-emitting polymers (LEP)—Most flat-panel displays require an external light source to produce a visible image, but LEP technology incorporates polymers that emit their own light. This improves contrast and lets LEP devices combine some of the best properties of flat-panel displays with some of the best properties of CRTs.

liquid-crystal display (LCD)—A liquid crystal is a special organic substance that has some of the properties of a liquid and some of the properties of a solid.

pixel—A contraction of pixel element, pixels are like the molecules of images. They represent the smallest portion of an image that can have a unique color value. Pixels comprise three colored dots: one red, one green, and one blue.

refresh rate—The number of times per second an entire screen of information is drawn, measured

in hertz (Hz). CRTs rely on high refresh rates for a flicker-free display because of the way the electron gun works. LCDs provide stable images at much lower refresh rates because individual pixels are updated instead of entire lines being constantly redrawn in a progressive scan.

resolution—A display's resolution is the total number of pixels it is displaying at once, listed as horizontal pixels by vertical pixels. For example, an LCD with a native resolution of 1,024 x 768 pixels displays a total of 786,432 pixels (1,024 pixels across each of the 768 horizontal lines that make up the image).

thin film transistor (TFT)—TFT technology represented a tremendous leap in LCD quality when it was introduced. Each pixel on the LCD screen is hooked to a separate transistor that regulates its voltage. This speeds up display response times and allows for a brighter image than is possible with older technologies such as DSTN. Advances in TFT displays have led to LCDs capable of producing over 16 million colors.

Input Devices

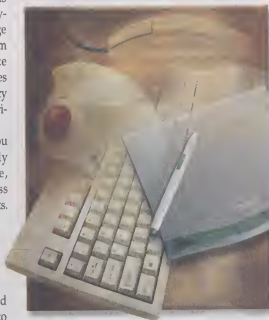
Keyboards, Mice & Joysticks Go Wireless & Get Comfortable

You may not give an input device much thought until necessity dictates you make a change. You may begin considering alternatives when a keyboard key stops working, your mouse no longer tracks horizontally or vertically, or your wrist hurts after spending too much time at the keyboard. You also may be driven to change when desktop clutter prevents you from moving your mouse, you want to create digital drawings with more precise strokes than a mouse can provide, or office policy demands that you augment system security with something more than a password.

To prevent repetitive stress injuries, you can always purchase an ergonomically designed input device. For example, MicroSpeed's 86-key Liberator wireless keyboard has very comfortable wrist rests. Similarly, the low contour case of MicroSpeed's KidTRAC and PC-TRAC Deluxe trackballs doubles as a natural hand rest, minimizing wrist angle by mirroring the natural profile of a hand. Similarly, Microsoft's Internet Keyboard Pro comes with a detachable palm rest to support your hands or palms when you're not busy typing.

If security is your biggest concern, you can buy a special keyboard, such as Key Tronic's Fingerprint Scanner Keyboard, to prevent unauthorized access to a network server or personal workstation. This input device has a built-in, high-resolution finger-imaging scanner you can use to identify users. The scanner component consists of state-of-the-art optics with miniature high-resolution cameras to record and read fingerprints as analog video signals. Built-in frame grabbers capture the

imaging signals and convert them to the digital information the computer needs to identify the fingerprint. When a user's finger image does not match any fingerprint image stored in the computer's database, access is denied.



■ **What's Hot.** Ergonomics, security, and desktop space aren't the only factors to keep in mind when purchasing an input device. To ensure you get the best package for your needs, take a look at what's hot.

Internet accommodation. With more users relying on the Internet and World Wide Web, a helpful input device needs to simplify access to online information. Microsoft's IntelliMouse, Kensington's TurboBall trackball and MouseWorks mouse, and Logitech's TrackMan Marble Wheel trackball all have a

scroll wheel to simplify Web page and long document scrolling. Additionally, most keyboards have at least two keys designed to support either the Windows 95/98 (Win9x) operating system or Win9x-compatible applications. Microsoft's specially designed Internet keyboards also sport seven Internet hotkeys that allow users to launch a browser and surf the Web directly from the keyboard.

Limited mechanical parts. Today's mice still resemble the original prototype that Douglas Engelbart invented in 1968. Typically, they are mechanical devices with a rubber ball on the underside. As you drag the ball across a flat surface, movements translate into digital signals the computer can understand. Tiny switches underneath the buttons on top of the mouse relay information about your clicks and the time interval between them.

For the most part, mechanical mice do a fine job of sensing movement, distance, direction, and speed. However, their precision rapidly deteriorates when dust, dirt, paper scraps, or lint gums up the rollers and sensors positioned next to the ball.

Optical mice, such as Microsoft's IntelliMouse, minimize the chance of breakdown by having no mouse ball or other moving parts that require cleaning. Instead, they track movement with an optical sensor (a miniature digital camera) and digital signal processor (DSP). The optical sensor captures digital snapshots and the DSP compares the captured images and translates any changes into on-screen pointer movements.

Logitech's TrackMan Marble Wheel also overcomes grimy buildup and dirt by replacing vulnerable mechanical trackball parts with an optical sensing system. The unit's marble is printed with a random pattern of dots. As your fingers roll the ball, a light beam shines on a small section of the dot pattern. The illuminated image then passes through a lens. The image's reflection bounces off a mirror on to the unit's optical sensor, which is capable of recording an image 1,000 times per second.

What's HOT

- Internet features such as scroll wheels
- Optical mice with limited mechanical parts
- Cordless devices
- USB connections

What's NOT

- Nonergonomic devices
- Mice without scroll wheels
- Keyboards that lack special buttons for Internet support

What's NEXT

- FEELit touch-sensitive technology
- More Internet-access tools
- Additional cordless and optical devices



Microsoft
IntelliMouse
Explorer

Changes in dot patterns reflect movement that is translated into on-screen cursor action.

Cordless freedom. If your keyboard won't reach your lap or your mouse cable gets tangled up in your desktop mess, you have several options. MicroSpeed's cordless Liberator keyboard operates by infrared (IR) signals, much like a television's remote control does. You simply attach the receiver module to the keyboard and PS/2 ports on the back of your PC, and the information you enter through the keyboard or the built-in trackball is sent via IR signals to the computer through the receiver.

Logitech's TrackMan Live! is a cordless input device with trackball-like qualities. Designed so you can control your computer with one hand while giving a presentation, it uses radio frequency (RF) rather than infrared technology to communicate with a radio receiver that can be up to 30 feet away. The advantage of using RF technology is that you don't have to point the TrackMan toward the receiver or even have a clear line of sight during operation.

Wacom's Graphire tablet for nonprofessional artists is another innovative input device that is

sure to please users who want both a cordless mouse and a way to draw or sign their names to word processed letters. The Graphire has an 8.2 x 8.4-inch tablet and pressure-sensitive pen, without a cord or battery, that is able to sense 512 levels of pressure. In addition, it comes with a cordless, batteryless scrolling mouse with a resolution of 1,015 lines per inch.

You can use the Graphire's pen to draw a picture or sign your name, and its built-in pen eraser operates just like a real eraser. You can use the cordless mouse just as you would a regular mouse, and you can use the built-in fingerwheel to scroll long documents and Web pages. Like the TrackMan, the Graphire's pen and mouse communicate through low-power radio signals rather than infrared technology.

Alternative connectors. If your computer has an Universal Serial Bus (USB) interface, you can attach a USB-compliant device or swap USB devices while your computer is up and running. There are no USB system settings to reconfigure and you won't have to open your computer to install any expansion cards. In addition, you can attach as many as 127 peripherals to one USB interface. Several manufacturers, including Microsoft, Kensington, Logitech, and Wacom make USB-compatible peripherals.

■ **What's Not.** Stay away from keyboards that have so many cursor keys they require excellent hand-eye coordination to use. A few years ago, Gateway marketed an unwieldy 125-key device called the AnyKey programmable keyboard. Instead of just four cursor keys positioned in the familiar inverted-T layout, it had almost a dozen, making it extremely difficult for users to move the cursor on-screen without looking at the keyboard.

Input devices should be ergonomically designed to maximize comfort and minimize stress. Beware of keyboards and trackballs that lack palm rests and mice that aren't shaped to fit the natural contours of your hand.

■ **What's Next.** One of the biggest innovations in the near future will be the use of FEELit technology. Logitech has just released the Wingman Force Feedback mouse, which uses proprietary FEELit technology to give users physical sensations as they encounter objects on-screen. Users feel different

Terms To Know

ergonomics—Ergonomics is the science of designing tools to meet the physical needs of people. An ergonomically designed keyboard is one with wrist rests and slopes, and an ergonomically designed mouse has a shape that fits the contours of your hand. If you hold your wrist at an unnatural angle for extended periods as you type, you'll be placing unnecessary pressure on the median nerve that runs through the circle of eight carpal bones in your wrists. The result of this pressure is the median nerve is pinched or compressed, which can result in carpal tunnel syndrome.

optical mouse—Unlike a conventional mechanical mouse, which translates ball motion into directional signals, an optical mouse uses light sensors rather than movable parts to detect motion.

Universal Serial Bus (USB)—The USB interface is a Plug-and-Play general-purpose port that is used for connecting a computer to peripherals such as printers, scanners, keyboards, mice, and trackballs. With USB, you can add a new device without installing a special expansion card or even turning off the computer. A USB-equipped PC can support up to 127 USB devices attached to it simultaneously.

force sensations as they meet up with or draw two-dimensional points, lines, and curves than they do when they encounter three-dimensional contours, surfaces, and textures. The technology also "weights" desktop icons, so resting the pointer on an icon that represents a large file actually feels different from resting the pointer on an icon that represents a smaller file.

In addition to the development of more wireless options, other input device developments will probably be Internet-related as more companies release products designed to facilitate browsing, downloading, and saving Web information to disk. [E]

by Carol S. Holtzberg, Ph.D.



MicroSpeed's Liberator wireless keyboard

Hard Drives

More Storage Capacity For Your Buck

Hard drives may not be the computer peripherals featured in trendy commercials with glamorous, European-looking 20-somethings pondering where to put the pricey toy, but they are nonetheless essential components in computing. Hard drive prices have fallen consistently over the past several years, which has definitely made powerful computers, capable of storing previously unheard of amounts of data, more accessible.

■ **What's Hot.** Hard drive prices have long been calculated by the cost per megabyte by users who wanted the lowest price for mass storage. In 1990, 200 megabyte (MB) hard drives cost about \$5 per megabyte. Times have changed. Compare costs for typical IDE drives taken from a recent catalog:

Drive Size	Price	Cost Per MB
6.4GB	\$119.59	1.87 cents
10.2GB	\$129.57	1.27 cents
13.0GB	\$139.82	1.07 cents
20.4GB	\$216.10	1.05 cents

Drive prices are calculated in cost per megabyte, but what were dollars are now cents, and bigger equals cheaper.

While Maxtor announced modest price hikes at the end of 1999, the low-price trend continues. Not only are drive prices per megabyte far less than in the recent past, the price per megabyte drops like a rock on drives greater than 10 gigabytes (GB). You should buy the biggest drive you can use.

What's fueling the trend? Technical advances that squeeze more data onto the 2, 3, or 4 platters found inside a typical hard drive account for the ability to make bigger drives. The low price per megabyte can be traced to the need to

build inexpensive drives for the rapidly-growing less than \$1,000 computer market, financial weakness in Asia (where most hard drives are built), and fierce competition among Maxtor, Seagate, Western Digital, Quantum, and IBM, the "big five" hard drive makers, who must also deal with threats from up-and-comers Samsung and Fujitsu. The result? Continued values on



massive mass storage, especially for Integrated Drive Electronics (IDE) drive users.

Not only are drives less expensive per megabyte than ever before, they're faster. Three major technical advances account for this trend:

Faster spin rates for the hard drive platters. The faster the speed of the hard drive platters, measured in revolutions per minute (rpm), the faster the data can be sent to the drive or retrieved from it. The least-expensive drives

today have spin rates of 5,400 rpm, a rate considered a superspeed just a couple of years ago. Now, many performance IDE drives have spin rates of 7,200 rpm, which contribute to better real-world performance compared to slower models. With the increasing use of computers for video playback and heavy multitasking, a drive that spins faster results in a computer that runs faster. High-performance Small Computer System Interface (SCSI) hard drives can spin at the mind-boggling rate of 10,000 rpm.

Bigger memory buffers in the drives. Drives have used on-board random-access memory (RAM) as a buffer, or cache, for years. A buffer acts as a temporary holding point for data until the drive is ready to use it. Buffer sizes of 128 kilobytes (KB) or less were common for several years, but as drive sizes have increased, cache/buffer sizes have increased, too. Most recent drives feature buffers of 512KB, but the fastest drives of 20GB and higher feature 2,048KB (2MB) buffers to improve performance.

The above features apply equally to IDE or SCSI drives, but this feature is strictly IDE:

Faster ultra direct memory access (UDMA) transfer modes. Originally, IDE hard drives transferred all data to and from RAM via the central processing unit (CPU), using a Programmed Input-Output (PIO) method. PIO speeds range from mode 0 (3.3MB per second burst rate) to mode 4 (16.6MB per second burst rate). All hard drives of 500MB or more support PIO modes 3 or 4. Enabling UDMA support in the system BIOS and installing drivers in Windows 95/98 (Win9x) lets hard drives transfer data directly to and from RAM, bypassing the CPU. All current IDE drives support UDMA33 (33MB per second burst rate), and the latest models support UDMA66 (66MB per second burst rate). UDMA66 drives come with a specially color-coded data cable that provides better signal quality.

Combine these trends, and you'll find that a 7,200rpm drive around 20GB is economical to

What's HOT

- Less expensive per megabyte hard drives
- Faster versions of IDE and SCSI
- USB and PC Card external hard drive kits for notebooks

What's NOT

- Hard drives under 10GB
- 5.25 inch hard drives
- Parallel port hard drives

What's NEXT

- Hard drive capacities of 40GB or more
- USB connections more common
- Home entertainment systems based on hard drive technology

buy and very speedy to use. But what if your PC is a notebook computer?

While many vendors sell hard drive upgrade kits for notebook PCs, these kits require a willingness to take apart systems that are, generally not meant to be examined by mere mortals. Thus, external hard drive kits for notebooks are hot. One example is the Buslink (<http://www.buslink.com>) USB External Drive. These units provide easy plug-in external storage for anybody with Win98 and USB ports. While their small size and rugged construction marks them as notebook computer accessories, USB drives can be attached to either notebook or desktop computers for effortless expansion of storage.

Notebook PCs that lack USB ports can still benefit from external storage by using the nearly universal PC Card (Personal Computer Memory Card International Association; PCMCIA) slot. Many vendors produce portable hard drive upgrade kits using the PC Card interface, which can be used to connect either the original hard drive or a new one to the system.

CMS Peripherals (<http://www.cmsproducts.com>) has taken the hot-swap nature of PC Card devices a step further with its Automatic Backup System. The System combines a hard drive, PC Card interface, and an intelligent

represent older technologies with smaller buffer sizes and slower rotation rates; why buy last year's technology when the latest is available at such low prices?

The 5.25-inch hard drive, the original form factor of hard drives, made a comeback a couple of years ago when Quantum released its Bigfoot 1 inch high x 5.25 inch wide hard drives. Sized to fit into empty 5.25-inch drive bays, their low cost per megabyte could not overcome their lackluster performance. Continued advances in hard drive technology allow similarly low prices on faster, more advanced 3.5 inch drives from Quantum and other makers. Bigfoot is dead, discontinued by Quantum, and there were few mourners at the funeral.

The parallel port, used for many different add-ons, is falling out of favor for portable hard drives and other storage devices. Different port configurations can cause problems with connecting printers and drives on the same port, and you must shut down the system to add or remove a drive attached to the parallel port. The rise of USB and the continued popularity of PC Card interfacing left the parallel port behind.

■ **What's Next.** Hard drive maker Maxtor (<http://www.maxtor.com>) has become the bellwether of hard drive trends; when Maxtor makes a particular type of drive, you can expect the rest of the industry to follow suit. Thus, its 40GB Diamond Max (5,400 rpm) and Diamond Max Plus (7,200 rpm) drives are sure to spur on the size race among drive makers. These drives are almost 80 times larger than the 500MB drive sizes common in late 1994.

At 3.5 inches wide x 1 inch high, these drives store 10GB per platter, thanks to improvements in media design and recording heads. As users install programs, download files, and create space-hogging multimedia content, big drives are a necessity.

Windows 2000, like Win98, will provide USB support, so you can expect to see USB storage peripherals in increasing numbers. USB devices can be plugged and unplugged instantly because they're hot-swappable, and they can be used on either notebook or desktop PCs that have USB ports. Systems with USB ports can share USB-based hard drives easily.

In addition to hard drives, expect to see more USB storage devices, including more CD-rewritable, optical, and even tape backups using this fast, flexible port.

Terms To Know

Basic Input Output System (BIOS)—A chip on the motherboard that controls the hard and diskette drives and determines what sizes will work in the system.

byte—Equal to either seven or eight bits, depending upon whether it requires an extra bit used for error correction. A byte stores a single character of information, such as the letter A or the number 2.

gigabyte (GB)—About 1 billion bytes.

Integrated Drive Electronics (IDE)—A 40-pin single-cable interface that is used by most hard drives and optical drives.

interface—Connects two different devices together to allow data to be exchanged.

megabyte (MB)—About 1 million bytes.

Small Computer System Interface (SCSI)—Intelligent 50-pin or 68-pin interfaces used by many types of devices.

Universal Serial Bus (USB)—An external interface that can be used to attach many different types of devices, including keyboards, mice, and drives.

While Digital Versatile Disc (DVD) is slowly starting to supplement VHS tapes at your local Blockbuster, VCRs are still king when it comes to time-shifting the second big game of the afternoon. But VCR's can't store anything but video, and they make you search through the tape to find the start of the second feature.

Popular IDE hard drive producer Western Digital has introduced a new hard drive built for home entertainment: the WD Performer series, made for DVD recorders, set-top boxes, audio-video jukeboxes, and home network servers. Based on the same IDE technology used in PCs, they are designed to handle multiple simultaneous play/record data streams. So, you can watch the big game while recording it, record the three-hankie movie on another station, and play back the archive of LP's you've stored through the speakers in the living room. **[E]**

by Mark Edward Soper



built-in backup program. The first time the unit is plugged into a portable computer, it backs up the entire drive's contents; subsequent uses back up only changed files. Files are stored in their normal formats for easy reinstallation to another hard drive in case of system failure.

■ **What's Not.** With the sinking cost of IDE hard drive storage, the days of buying hard drives under 10GB to save money are over. As the price chart indicates, you'll pay almost twice as much per megabyte to buy a small hard drive. Many drives under 10GB

Removable Storage

Bigger & Faster Technologies Lead The Way

Unlike the rest of the computing universe, over the past decade the world of removable storage remained remarkably static. All computers came with a 3.5-inch diskette drive that could store 1.44 megabytes of information on a diskette, and that was that.

Sure, if that's all you had, you could go out and buy a Zip drive or a Jaz drive from Iomega, but these kinds of drives didn't become standard equipment on PCs until about 18 months ago. It wasn't until then that PC manufacturers finally realized that many files are too big to store on single 1.44MB diskettes.

Here, we look at some of your removable storage options, but we also warn you about products that are on their way out, as well as point to products and trends that we see on the horizon. Removable storage hasn't been one of the most exciting computing topics, but that's about to change dramatically as products continue to evolve during the next few years.

■ **What's Hot.** The hottest forms of removable storage are coming in a number of different formats. You'll find hundreds of megabytes (MB) and even gigabytes (GB) of storage in cartridge, diskette, compact disc, and even card form. How much storage you require and what you need your media to do will determine what you buy.

Cartridges. Users with large storage needs have traditionally turned to the Iomega Jaz drive (<http://www.iomega.com/jaz>). The standard version of this drive uses the extremely fast Small Computer System Interface (SCSI) and offers 2GB of storage, but it also is available in a 1GB version. You can

get the 2GB external drive from Iomega for \$350; 2GB disk cartridges run about \$125 a piece (\$300 for a three-pack).

Although competitors have come and gone, perhaps the most serious contender to the Jaz throne is the Castlewood ORB drive (<http://www.castlewood.com>), which offers 2.2GB of storage per cartridge. An external



Universal Serial Bus (USB) drive costs \$280; an internal Enhanced Integrated Drive Electronics (EIDE), the connection standard used for many hard drives) version costs \$200. Disks cost about \$30 a piece.

In terms of value, the ORB drive definitely beats the Jaz drive in cost per megabyte of storage. However, Iomega has been around far longer than Castlewood and has a firm hold as

an industry standard, so you may feel more comfortable going with the established name. For now, the ORB stands as a strong competitor to the Jaz drive.

The new diskettes. If the cartridge systems seem pricey, consider upgrading your diskette drive. Both Imation and Iomega have developed diskette technologies, but they are, of course, incompatible.

Iomega's offering is the Zip drive (<http://www.iomega.com/zip>), which has been on the market for several years. Although the original 100MB Zip drive is still available, Iomega has added a 250MB capacity drive to its line. Because Zip disks are larger, the drive cannot read or write to standard 3.5-inch diskettes. If you buy the disks in packs of 10, you can expect to pay \$10 for each 100MB diskette and \$15 for each 250MB diskette. Drive prices vary according to their connection speed and whether they're external or internal. A 250MB USB Zip drive is about \$180 while a 100MB parallel port drive costs roughly \$100.

The other option is the newer SuperDisk (<http://www.superdisk.com>) drive from Imation. Each SuperDisk offers a hefty 120MB of storage, but that's not the best part about the SuperDisk drive. The biggest advantage is that you can use your standard 3.5-inch diskettes in the drive. A parallel port SuperDisk drive costs about \$100, and you'll pay about \$130 for the USB version.

If you buy the SuperDisks in multipacks, they cost \$10 each.

Which should you buy? In this case, it's a matter of personal preference. Both products are well supported; although, the Zip drive has more of a foothold in the market right now. If you have a bunch of 3.5-inch diskettes that you'd like to continue to use, and you're removing your older diskette drive, you should get a SuperDisk drive. However, the biggest factor may be what you use at work; you don't want to go with the opposite standard if you bring a lot of work home.

What's HOT

- USB
- Zip and SuperDisk drives
- CD-RW drives

What's NOT

- Parallel interfaces
- 3.5-inch 1.44MB diskettes
- Tape drives

What's NEXT

- DVD-RW
- IEEE 1394 (FireWire)
- Smaller, faster, more capacity

CD-RW. If you need more capacity than the new diskette solutions can hold, consider a compact disc-recorder. We first saw this technology in the CD-recordable (CD-R) drive, which allowed users to record up to 650MB on a single CD. The disadvantage was that once you saved information to the CD, it was unerasable.

Now, we have CD-rewritable (CD-RW) drives, which offer the same benefits of CD-R, but you can write over information that is already saved on a disc. Because these discs are reusable, they are more economical in the long run, particularly if you just want to save backups of files or exchange large files with other users.

Memory cards. Although they aren't a pure PC technology, memory card devices are a technology to keep an eye on. They're mainly designed for digital cameras and other devices that need a relatively large amount of removable memory in a small package.

As an example, Sony offers the Memory Stick line. Unlike a diskette, the Memory Stick is a kind of **flash memory**, which means it is nonmagnetic and uses integrated circuits and solid-state chips for storage. Because it uses no moving parts, such as rotating disks or read/write heads, the Memory Stick can save and recall data much faster than a diskette or Zip drive. For \$100, you can purchase a 32MB stick while a 64MB stick runs \$190.

■ **What's Not.** A few removable storage technologies have run their course and it is time for them to move on down the road.

Tape drives. The one thing that tape drives have going for them is that they can back up entire hard disks on a single tape. For instance, the Seagate Hornet 20GB Travan drive can back up all but the beefiest of hard drives on one of its 20GB tapes. This is a great gizmo, sure, but it's better left to the

Sony Memory Stick (64MB version)



professionals who need massive backup capabilities to run their businesses. Plus, it's not realistic to expect home users to have a need for one.

Instead, home users should aim for two multiuse drives: a Zip or SuperDisk drive and a CD-RW (or DVD-RW) drive. This configuration is much more flexible and allows for easier file exchange with others.

Standard diskettes. The days of standard diskettes are nearing their end. We say "nearing" because they still have a few breaths of life in them because they are so cheap and universal.

However, with the ability to transfer most sub-1.44MB files via e-mail and the fact it requires several CDs to install software packages such as Microsoft Office, it's easy to see their days are numbered. Actually, the end has been in sight ever since it took more than 20 diskettes to install Windows 95.

Parallel ports. Over the next few years, you can expect the parallel port to gradually pass out of use. Although the port works fine for printers, it is not up to the challenge of handling today's devices. Speed is an issue, but it's not the primary concern. Instead it's the proliferation of computer components, such as scanners and external drives, which require a fast connection.

It's not uncommon to see several devices connected to the same parallel port. This is called daisy-chaining and in this case, each device is linked to a pass-through port on the back of another device. The last device in the chain is connected directly to the PC's parallel port. This allows all the devices to be connected to the PC.

This method of connection is not ideal because it can slow down the different

components and prevent them from operating at their full capacity.

USB ports are easier to configure and manage and allow many devices to connect to a single port without any loss in speed or function. So, if your system has a USB port on it, we'd suggest you buy a USB model for your external removable storage devices. This will increase your speed and prevent a logjam on the parallel port, which is probably already in use by your printer and maybe a scanner, too. You want to make sure your drive is capable of communicating with future PCs, which may not include a parallel port.

USB devices are slightly more expensive than parallel port devices, but they are worth the long-term investment. However, when the older parallel devices go on clearance in the future, you may not be able to pass up the deep discounts that stores will offer.

■ **What's Next.** Is the end in sight for removable storage devices? The release of Apple's iMac suggested that very possibility because the early versions of the system came without a diskette drive. Apple's reasoning at the time was that people were using the Internet to exchange files so much that the diskette drive should be considered an option. Besides, the ease of downloading files has eliminated one of the prime uses of removable media: installing programs to PCs.

Obviously, the age of Internet storage is already here. Services such as FreeDrive (<http://www.freedrive.com>) and Driveway (<http://www.driveway.com>), allow you to store files to distant computers through the Internet; you can then access or restore them on your local PC whenever you want. You can also use these services to exchange files with other people. Simply give the recipient



Imagemaster
250MB SCSI Zip drive

the required access information and password, and they can go online to get the file whenever they want; no disks, tapes, or cartridges needed.

In the near future, these technologies won't replace traditional removable storage devices. There are still too many limits on Internet bandwidth to allow all files to be exchanged via the Web. In addition, security issues still need a little bit of work until many users will feel comfortable exchanging all their files over the Web. For now at least, not even the Internet beats the convenience and security of storing and exchanging files with traditional removable media. Don't be surprised, however, if you see more and more file exchanges happening over the Internet in the next several years.

DVD-RAM and DVD-RW. Although digital versatile disc read-only memory (DVD-ROM) drives have been included in computer systems for some time, the rewritable version is lagging a bit behind. Some companies (most notably Creative Labs and Sony) have already released DVD-RAM drives, which can store 2.6GB of information on a single-sided disc. These drives generally cost between \$150 and \$200, and the discs run about \$30.

The problem is that there is an incompatible, competing standard for rewritable DVD. DVD-RW drives, which offer 3GB of storage per disc side are just around the corner, and several companies, including Sony and Hewlett-Packard, have already thrown their support behind this standard.

It's too early to say which technology will win, so you'll probably be better off waiting to see if companies stick to either one or the other. This struggle over format should be over within a year or so. In the meantime, stick to one of the other options listed in this article.

IEEE 1394. While USB is the technology of the present, IEEE 1394 (also known as FireWire) is the technology of the future. With a maximum transfer rate of 400 megabits per second (Mbps), the only thing that is preventing the adoption of IEEE 1394 right now is the relatively high cost. But as that cost goes down, we'll see more and more manufacturers adopt this technology for high-speed removable storage drives.

As we've mentioned, the best alternative is to pick one or two removable storage technologies and stick to them. Our basic recommendation would be to purchase either a Zip or SuperDisk drive. Then, if you needed additional storage, we'd suggest either a CD-RW drive or the Castlewood ORB drive. If you can't wait a little

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while longer, you might want to consider waiting for the winner in the rewritable DVD race. No matter which standard you choose, the removable storage market is moving ahead in a

major way to make it that much easier for you to store information. **LS**

by Shaun Mummert

Terms To Know

Enhanced Integrated Drive Electronics (EIDE)—Also known as Fast AT

Attachment (Fast ATA), this is an updated version of the Integrated Drive Electronics (IDE) storage interface that works with hard drives, CD-ROM, and removable storage drives. It can shuttle data to and from the drive three to four times faster than the IDE standard (transferring data between 11MB and 16.6MB per second) and can support data storage devices that store up to 8GB more than IDE drives. Although it's not as fast as SCSI, EIDE is easier to use and enhancements to the technology have made it competitive with SCSI devices.

IEEE 1394—A technology standard developed by the Institute of Electrical and Electronic Engineers that allows computer components to attach to PCs and transfer information at up to 400 megabits per second (Mbps). Although it is expensive, IEEE 1394 should soon

gain wider acceptance for components that require high-speed transmissions, particularly storage devices and digital camcorders. Also known as FireWire.

parallel interface—A data transmission scheme that sends information over wires connected in parallel. A parallel interface allows for the transfer of more than one bit of data at a time. This type of channel is usually found between a computer and a peripheral, the most common on a PC being the parallel port used to connect the printer to the computer. The faster and more versatile USB standard is beginning to replace the slower parallel interface in many devices.

Small Computer System Interface (SCSI)—A standard for parallel interfaces that transfers information at a rate of up to 80 megabytes per second (MBps). Up to seven peripheral devices, such as a hard drive,

CD-ROM drive, or removable storage drive, can attach to a single SCSI port on the system's bus. Fast and expensive, SCSI is used less now because of the difficulty associated with using it.

Universal Serial Bus (USB)—A type of external bus expected to replace parallel and serial ports. With a maximum transfer speed of 12 megabits per second (Mbps), USB is designed primarily for low- to mid-speed peripheral devices, such as keyboards, mice, modems, printers, joysticks, and some scanners. Although some bandwidth-intensive devices, such as digital video cameras and storage devices, use USB today, these will eventually use the IEEE 1394 (FireWire) standard. A main advantage of USB over traditional ports is that it offers easy expandability; up to 127 devices can be daisy chained, far more than the number of devices supported by traditional ports.

Printers

Remote Administration & Multiple Functions Push Printers Forward

Admit it, once the price dropped on color inkjet printers, and they became common, you started to forget the bad old days of printing. You remember, don't you? Most users had the choice between lousy dot matrix printing and noisy daisy wheel printing. And you didn't even think about color because that was just for publishing professionals.

Well, now most home users who want color printers have a color inkjet. Prices have dropped dramatically, and we're all reaping the benefits. Is there another such revolution on the horizon? That's hard to predict because the last pricing drop and functionality increase was so dramatic. In general, however, we can expect printers to get both cheaper and better. So even if there are no revolutionary improvements, the future still looks bright.

Below, we look at the present state of the printing market, including what you should look for, what to avoid, and what's on the horizon.

■ What's Hot. The days are gone when you have to have room on your desk for your printer. Networked printers and Web administration give you a little more desk space to work with. In addition, printers don't just print anymore; multifunction devices, which print, copy, and scan, have gained a strong foothold in the market and will only get better in the future.

Web administration. Yes, everything is moving to the Web these days, and printers are no exception. Network administrators who want to keep tabs on their printers used to have to rely on standard, network-based

software packages. Now, printer manufacturers provide software so these administrators can monitor their printers over the Web.

A good example of this kind of software package is Web JetAdmin, which comes with Hewlett-Packard JetDirect print servers; these devices allow printers to be connected to a network. In short, this software lets administrators control printers over the Web the same



way they used to with the old JetAdmin software, which required them to be directly logged in to the network they were administering.

In the long run, this is not an earth-shattering development, but it definitely offers more convenience to those harried folks who run

corporate networks. Look for this technology to evolve over the next few years as more functions and features become standard on printers.

USB. Universal Serial Bus (USB) is the technology of the present for printers. Although the older parallel port technology offered decent connectivity, USB ports are easier to use, and they offer faster speed.

USB ports allow as many as 127 devices to connect to a single port without any loss of speed or functionality. So, if your system has a USB port on it, we'd suggest buying USB components to prevent the logjam on the parallel port. (Many people daisy-chain a series of devices to connect to the parallel port. That is, each device is linked to a pass-through port on the back of another device. The last device in the chain is connected directly to the PC's parallel port. We don't recommend this if you can avoid it because the resulting connection is slow.)

If you have an older parallel port printer, you don't have to replace it right now. However, you should consider purchasing a USB printer the next time you upgrade for the sake of future compatibility. This is particularly true because most people seem to keep their printers longer than they do their PCs. You want to make sure your printer is capable of communicating with a future PC that may lack a parallel port.

Ethernet. Like USB, Ethernet is another technology to buy into. After all, in a networked world the printers of the future will be networked, as well. If you're buying a printer for a network, you should buy a printer with the network card already installed in it. This is one less device to plug in, and you'll eliminate several cords at the same time.

What you'll be looking for in a networked printer is one that has an Ethernet port already installed (unless you already have another kind of network). Ethernet is the most common technology that connects offices and networks throughout the world. Look for printers

What's HOT

- USB and Ethernet
- Cheap four-color inkjets
- Cheap monochrome laser printers

What's NOT

- Parallel interfaces
- Supercube inkjets
- Monochrome inkjets and inkjets with swappable cartridges

What's NEXT

- Affordable color laser printers
- Internet printing

with onboard network cards with speeds of 10 megabits per second (Mbps) and 100Mbps.

Printers that connect via wireless infrared technology may tempt you, but you should resist that temptation. We've had bad luck with infrared technology and have been generally dissatisfied with its performance. Although the technology is undoubtedly improving and may be worth revisiting at some point in the future, go with Ethernet, which is a proven networking technology.

If you already bought a printer, you can buy an attachment that will allow you to connect it to an Ethernet network. One such device is the HP JetDirect 300X 10/100Base-TX Print Server. For \$250, you can connect your printer to your network with a maximum speed of 100Mbps. Even for small offices, it's generally cheaper to share a printer than it is to buy printers for each desktop.

Multifunction devices. Just like network cards are built in to printers, manufacturers have been combining other components with printers for some time. For several years, the small office/home office (SOHO) machines have combined a high-quality inkjet printer with a fax, scanner, and copier. Companies such as HP, Ricoh, Brother, and others have released such machines. In fact, we don't see any end to this trend.

Although there are many devices for the home office that include the basics, we've also been seeing an increasing number of business machines that include multiple tools, such as high-end scanners and copying technology. In the future, most users may rely on a single standard imaging device for copying, scanning, printing, and faxing. In the short-term, however, scanner manufacturers don't have that much to worry about because those single-machine days are still in the near future.

If you're in the market for a multifunction machine, look for one with top-notch print

quality. Good inkjets are fine, but you may as well go for laser if you're going to drop several hundred dollars on this kind of product. The fax components are up to you. If you already have faxing capabilities with your modem that you're comfortable using, you may not need an onboard fax. However, if you want to share faxing capabilities among several people, it's much better to have a fax included in your multifunction device.

■ **What's Not.** It's about time for one of the longest mainstays of the computer industry, the parallel port printer, to ride off into the sunset because the USB revolution has reached printers. Also be on the lookout for those ultracheap inkjet printers that may cost you more in poor quality than they're worth.

Parallel ports. Far be it from us to declare the venerable parallel port dead, but there's no question that it's on its last legs. You may be wondering what the problem is because the parallel port works fine with your printer. Speed is a major factor because USB ports generally allow faster speed, but it's not the primary concern. Instead it's the proliferation of computer components that require a fast connection, such as scanners and external drives. Because it will become more common that these types of devices will come with USB connectors, you'll want to stay on top of this trend.

As we noted above, it is best to avoid buying parallel printers if at all possible. Instead, look for a USB printer. Or, if you're a business user looking for a network printer, buy a printer with the network card already installed. Parallel ports are familiar, but don't let that comfort with a dying technology lead you into a bad decision.

Supercheap inkjet printers. Because prices continue to drop, it shouldn't surprise you that you can find some new printers for less than \$100. Unfortunately, these printers aren't a bargain. We hate to pick on HP because its products are usually so good, but the whole Apollo line of printers doesn't offer particularly good value. There is really no reason to save \$30 on the cost of a printer only to suffer a tremendous drop in printing power. You're far better off spending the extra money and getting a solid printer.

How can you keep from falling into the trap of buying an obsolete printer but still take advantage of great bargains? The easiest way is to make sure the printer supports good resolutions. Any decent printer will support resolutions of either 1,200 x 1,200 dots per inch (dpi) or 1,440 x 720 dpi. In addition, the printer should print both color images and black text well. And, avoid any printer that requires that you swap the cartridges when you want to change from text mode to color mode or vice versa. Swapping cartridges causes too much wear and tear on your printer to make it worth your while.

A printer that meets the above specifications will still only cost you less than \$200. Don't be afraid to drop a few more dollars on a quality machine. Sure, you're paying a little bit more, but you're getting a printer that isn't obsolete coming out of the box. These printers tend to be a little sturdier, too.

■ **What's Next.** No, there isn't any better system than printing on paper on the horizon. However, how you send your print

**Printers
that connect
via wireless
infrared
technology may
tempt you,
but you should
resist
that temptation.**

Hewlett-Packard JetDirect 300X



jobs is going to change. In addition, we expect the color laser market to finally come within reach of the average consumer and small business.

Internet printing. Perhaps one of the most exciting developments in printing is the possibility of printing over the Internet. Microsoft's Windows 2000 promises to have the ability to use the Internet to print a document to a distant printer.

The system is designed to work so that once your printer is attached to a Windows 2000 server, other users will be able to print to it using a Web address. That is, instead of sending it to a printer connected to their system, users will send it directly to a Web address such as <http://www.printer.com/printer1>. This should be a particular advantage for workers who travel or telecommute.

In the past, if a telecommuting worker wanted to give a co-worker a printed version of a document, he or she would have to send it via e-mail, making sure the format was correct. Then, the co-worker would have to print out the document. With Internet printing, most of these steps are eliminated because the telecommuter can simply send the document to the printer and let the co-worker know that it is coming.

Of course, it's likely that other software companies will follow Microsoft's lead and come up with ways to allow users to print over the Internet. Some questions still remain, such as speed and security; after all, you don't want a hacker intercepting your print jobs and looking at them. But overall, the technology has great promise.

Cheap color laser printers. One of the most exciting prospects in the near future is the possibility of affordable laser printing for home users and small businesses. While large businesses have been adopting color laser printing during the past decade, color printers generally cost several thousand dollars. This may not be much for a large company, but for the average user, it was way too much money to spend, particularly when inkjet printers were capable of doing a fine job.

Recently, QMS (<http://www.qms.com>) started offering its magicolor 2 DeskLaser printer for \$1,300. With price cuts and rebates, the price of this printer can drop below \$1,000, which is an astonishingly low price for any color laser printer. QMS has



been in the business of making value-oriented color printers for some time, so perhaps we should not be surprised to see that company helping to reduce the price of color laser printers.

For the home user, we can only hope other manufacturers follow the QMS lead and start pricing laser printers for the home and small office. It is reasonable to expect that within five years, we may see color laser printers that cost

less than \$500. This in turn would help drive inkjet prices even lower.

If you're looking to upgrade, our advice is simple. Assuming you have a USB port and Windows 98, purchase a USB inkjet printer that prints both color images and black text well. You can't go wrong with a parallel printer in the short term (if you're prevented by a lack of USB port or an earlier version of Windows), but you're better off paying the premium and going with the faster connection.

Then, if you need high-quality text printing, spring for a monochrome laser printer in addition to the color inkjet. Although color laser printers are still too expensive for home use, we expect that to change in the near future. The future is bright for printing, and the present is looking pretty good, too. **LE**

by Shawn Mummert

Terms To Know

dots per inch (dpi)—A measure of printer resolution that indicates how many ink dots the printer can place in one square inch. The larger the dpi, the sharper the printed image. A text printer should have at least 600dpi; a graphics printer should have at least 1,200 x 600 or 1,200 x 1,200 dpi.

Ethernet—The most widely used local-area network (LAN) protocol, Ethernet was created by Xerox in 1976. Later the standard was rewritten by Xerox along with Digital Equipment and Intel. Ethernet is the original carrier sense multiple access/collision avoidance (CSMA/CA) LAN that lets PCs connected to the network listen for pauses before they "speak." Older Ethernet networks used

either thin or thick coaxial cable to connect computers. A newer system called 10Base-T uses wiring similar to that used in telephone systems and transfers data at up to 10 megabits per second (Mbps). Fast Ethernet, known as 100Base-T, allows transfers at 100Mbps.

parallel interface—A data transmission scheme that sends information over wires connected in parallel. A parallel interface allows for the transfer of more than one bit of data at a time. This type of channel is usually found between a computer and a peripheral, the most common on a PC being the parallel port used to connect the printer to the computer. The faster and more versatile USB standard is beginning

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Scanners

Now Offering Speed & Ease Of Use; Scanning The Horizon Gets Even Better

Scanners first emerged as a consumer peripheral approximately five years ago. Since then, thanks to steep improvements in scanning technologies and an equally steep decline in scanner prices, these desktop imaging devices have soared in popularity. Today, you'll find scanners in schools, homes, small businesses, and corporate offices everywhere.

■ **What's Hot.** Generally speaking, enhancements in scanner performance and usability are hot right now. Users want products that have impressive specifications and are easy to use. Fortunately, plenty of scanners currently on the market offer both.

High resolution and bit depth. The hot trend in scanner technology right now is the move to an optical resolution of 1,200 dots per inch (dpi) and a bit-depth rating of 42 bits. That's 900dpi more than the recommended resolution for most scanning jobs and 18 bits more than most scanning software can handle. Talk about overkill.

"Do consumers really need 1,200dpi?" asks Mary Ann Whitlock, director of marketing for Microtek Lab. "Probably not. Matter of fact, more than likely not because they're going to have huge files if they're scanning at 1,200dpi. Three hundred dots per inch is quite adequate, but the American market likes to think bigger is better. So you get into the higher resolution, greater bit depth."

Overkill it may be, but that doesn't mean you should shy away from scanners that offer prodigious technical specifications. A 42-bit scanner never hurt anybody. You probably

won't find a sub-\$100 scanner with these specifications anytime soon. If you're shopping in the \$200 to \$300 price range, however, we suggest you choose a scanner that has a high optical and high bit-depth rating. You have nothing to lose by doing so.

(NOTE: You may find while shopping for scanners that some models advertise a resolution exceeding 1,200dpi. These scanners may boast a resolution of 4,800dpi or 9,600dpi. Ignore these inflated



specifications that refer to the scanner's computer-enhanced resolution. Computer-enhanced resolution is a measurement of an image's resolution after the scanning software has digitally enhanced the image. Such enhancements may improve the quality of some images, but it will cause unnecessary fuzziness in others. We recommend against using

computer-enhanced resolution. It's the optical resolution that really matters.)

USB ports. Universal Serial Bus (USB) is a new type of bus that brings plug-and-play expandability to the personal computer. As soon as USB came out, it was expected to replace the parallel port. And, if the latest round of scanner products is any indication, it's starting to do that already.

"According to data information for 1999, parallel ports had 38% of the market, and USB had 19%," says Lynn Lin, product marketing manager at UMAX Technologies. "In a couple of years, USB will probably have more than 80%. Percentage-wise, USB will have dramatic growth in the next three to five years."

The USB port is capable of supporting data transfers of 12 megabits per second (Mbps), which is equivalent to 1.5 megabytes per second (1.5MBps). This compares to transfer rates of 500 kilobytes per second (KBps) to 2MBps for an enhanced parallel port (EPP) connection. USB ports can support as many as 127 peripheral devices on a single port. This provides virtually unlimited expandability. For example, you could connect a scanner and a Zip drive to a single USB port by daisy chaining them together.

With a parallel port, you could connect only one of the two devices to your PC.

The most important advantage of USB ports, however, isn't speed or expandability; plug-and-play ease of use is what makes USB so popular. USB makes true plug-and-play usage a reality. All you have to do to get a USB scanner up and running is install the scanning software and plug the scanner into the PC's USB port. You don't even have to restart your computer. The computer recognizes the scanner immediately.

One-touch scanning. One-touch scanning brings photocopyer convenience to the scanner. All you do is place the document on the scanning surface. Then, instead of going through 14 software steps to execute the scan, you simply press one button on the front of the scanner.

What's HOT

- 1,200dpi resolution
- 42-bit scanners
- USB ports
- One-touch scanning

What's NOT

- Parallel ports
- CIS technology
- Sheetfed scanners
- Multifunction devices

What's NEXT

- FireWire connectivity for more speed
- Scanning appliances that don't need an active PC connection
- Scanning solution packages

The scanner automatically scans the document and transmits the data to your PC. This represents a small step in scanning technology, but it's perhaps the greatest leap in scanner usability to date, says John Blair, vice president of marketing and engineering at Visioneer.

"My car has a little remote for unlocking the door," Blair says, explaining how a little thing like one-touch scanning can be hotter than through-the-roof product specs. "I like that little remote better than I like the six-cylinder engine. And I tell you what, the six-cylinder engine cost me a lot more than that little remote for opening the door. That's technology versus usability. Usability is what will continue to be hot. The one-touch scanning is hot now."

Several scanner manufacturers, including Microtek, UMAX, and Visioneer, produce one-touch scanning devices that connect to your PC and automate the scanning process for you.

■ **What's Not.** Obsolescence has begun to strike the scanning markets, but keep in mind that obsolescence is not a death penalty. If you have a so-called obsolete scanner that continues to meet your scanning needs, you don't have to junk it. But if you choose to purchase a replacement, make sure it doesn't have any of these handicaps.

Parallel ports. Considering that USB is one of the hot trends in scanner development, it should come as no surprise that the days of the parallel port are numbered. "Everybody seems to want USB," Blair says. "This time last year, [more than] 90% of the units we shipped were parallel port units. This time right now, about 70% of the units going out are USB units. We expect by this time next year, 90% will be USB."

Manufacturers will continue to produce some parallel-port-based units to accommodate older PCs that don't have built-in USB ports. Additionally, a few manufacturers are selling dual-interface scanners that support both USB and parallel port connections. The Microtek V6 UPL scanner is an example of this type of product.

Contact-image sensor technology. Not too long ago, the scanning industry was abuzz with talk about a pair of image-sensing technologies. Everyone wanted to know which was better: the traditional charge-coupled device (CCD) technology or the new contact-image sensor (CIS) technology.

Scanners that used the CIS technology were thinner and weighed less than scanners that used the CCD technology. CCD scanners, however, offered superior image scanning quality and could be produced more cheaply than CIS scanners. It was difficult to determine which technology would win the contest.

Well, the contest has ended, and CIS gets the "Nice try, but . . ." award. When it comes to scanners, it turns out that price and quality are far more important than physical dimensions and weight. Consider that a CIS-based scanner is not capable of supporting an optical resolution greater than 600dpi. That's a debili-

[Microtek's CIS-based scanners]," Whitlock says. "But we will not be continuing with the CIS technology. The CIS technology, believe it or not, is still rather expensive. You have to sell a lot of scanners to get the price down, and the manufacturers making those aren't selling enough to drive the price down."

In other words, the profits from CIS-based scanners are not as large as the profits from CCD-based scanners. As a result, scanner manufacturers are focusing their efforts on the CCD technology.

Sheetfed scanners. The de facto scanner model these days is the flatbed. There are reasons for that. Flatbed scanners provide exceptional scanning quality, for one thing. They're also easy to use. The same cannot be said for sheetfed scanners, which were once quite popular as desktop scanning devices.

The primary attraction of a sheetfed scanner is its size. Unlike a flatbed scanner, which consumes at least two square feet of space on your desk, a sheetfed scanner takes up very little room. It's about the size of an egg carton turned on its side. You feed your document into the front of the sheetfed scanner, and a set of rollers pulls the document under the electronic sensors. The document then passes out the back of the scanner.

The drawback to sheetfed scanners is scanning quality. Frankly, sheetfed scanners just aren't very good. Scanned images appear fuzzy and distorted. Text may be difficult to read. Colors look faded and dull. Plus, the scans are extremely slow, and if the rollers slip while the scan is in progress, you have to send the document through again.

Multifunction devices. "It's an interesting thing," Whitlock says, when asked about multifunction devices. "I thought multifunction devices were really going to take off. But they've been out for about three years, and it's been very slow. They just have not taken off."

One reason for this, Whitlock believes, is the all-in-one nature of multifunction devices (MFDs). "I think the consumer wants to feel very safe and secure that each of the pieces of the multifunction devices is modular," she says. "If one piece needs to be repaired for whatever reason, it's not going to disable everything else. I think people are afraid they're going to lose productivity, they're going to lose their original, they're not going



UMAX PowerLook III



Visioneer's Strobe Pro

tating limitation when 1,200dpi scanners are all the rage. Similarly, CIS-based scanners have a limited depth of field, which restricts their ability to scan three-dimensional objects.

What may have squelched the CIS technology more than anything, however, is the fact that scanner manufacturers have been unable to make a healthy profit from it. "We've sold tens, if not several hundred thousand units between the SlimScan C3 and SlimScan C6

to be able to maximize if something goes awry."

■ **What's Next.** The future of scanners looks bright, with advances in both technology and usability. In addition to higher resolutions and greater bit-depth rates, look for faster interface standards and alternative scanning options.

FireWire connectivity. FireWire, which is also known as the Institute of Electrical and Electronics Engineers (IEEE; pronounced eye-triple-ee) 1394, is a high-speed data interface that supports data transmissions at rates of up to 400Mbps. Like USB, FireWire provides plug-and-play expandability and can support as many as 63 devices daisy chained to a single connection. It's currently available on high-end corporate scanners only, but it should reach the consumer market at some point down the road.

Will FireWire ultimately replace USB? "Probably not," says Whitlock of Microtek, "because FireWire will be costly. In terms of a trend [and] where it's going to end up in the next three years, it could be ported down. But will it be ported down to the \$100 or \$150 scanner? Probably not. We want to keep some differentiation between products."

Scanning appliances. A scanning appliance is any electronic component that allows you to scan documents and images without an active connection to a PC. An example of one such scanning appliance is the Microtek ImageDeck, which was released last year. The ImageDeck is a standalone scanning device that contains both a 3.5-inch diskette drive and a Zip drive. When you use the scanner, the resulting digital images are saved to either of these drives. You then carry the disk or diskette to the computer on which you're working. Microtek currently targets the ImageDeck toward multiuser corporate environments, but it sees similar scanning devices eventually being used in the small office/home office (SOHO) market, as well.

"I see it moving to the SOHO environment within another 12 to 18 months," Whitlock says. "Right now, our price point is \$499. For the SOHO market, we're looking for that to be around the \$199 or \$249 price point. For the small office or home office, where you are limited in space, you can put this unit anywhere: behind you, on your credenza, across the room. You just need an outlet; you don't need to have it connected to the PC with its 3-foot cable limitation."

The scanning solution. As the scanner becomes a more popular component, scanner

manufacturers will offer scanning solutions. A scanning solution is a typical scanner bundled with several hardware and software enhancements that are intended to maximize your scanning capabilities in a particular area. For example, a Web publishing scanning solution may include a flatbed color scanner, a multi-page feeder to facilitate the scanning of several documents, and compression software that allows you to transmit digital image files across the Internet quickly.

The rise of a scanning solution depends on the maturation of the scanner market. But as the market matures and scanner owners become more comfortable with their scanners, they'll find more specific ways in which they

want to use their scanners. Scanning solutions are aimed at users who have these types of particularized needs.

■ **What's Now.** Like CD-ROM drives, printers, and modems, scanners have become a necessary peripheral component for both the home and small office environments. A scanner helps you archive data, enhances the desktop publishing experience, and does wonders for your Web site. The hot development trends of the present just make scanning better and easier. We hope the hot development trends of the future will do the same thing. [E]

by Jeff Dodd

Terms To Know

bit-depth rating—

Measures the amount of data used by the scanner to describe each pixel. A scanner that has a bit-depth rating of 24 bits, for example, uses 24 bits of data to describe each pixel in a scanned image.

bus—The channel that carries data between two components in a computer.

charge-coupled device

(CCD)—A type of electronic sensor found in most scanners today. A typical scanner uses a system of mirrors and lenses to bounce light, either from a fluorescent light or a cathode-ray tube, off an image. The CCDs detect the reflected image and convert it into thousands of tiny dots, called pixels.

contact-image sensor

(CIS)—Another type of electronic sensor that detects reflected light in some scanners. Unlike CCD-based scanners, CIS-based scanners use

light-emitting diodes (LEDs) rather than fluorescent lights or cathode-ray tubes. Also, CIS scanners don't use mirrors or lenses to reflect the light back to the sensors. The CIS receives the light that reflects directly off the image.

daisy chain—To connect a number of peripheral components in a series. The first component connects directly to the computer, the second connects to the first, the third connects to the second, and so on. "Daisy chain" is also used as a verb to describe the action of connecting devices in that pattern.

enhanced parallel port (EPP)—A second-generation parallel port technology that provides fast data transfer rates.

optical character recognition

(OCR)—The conversion of a digital image into digital text. OCR software analyzes a digital image for recognizable alphanumeric characters.

It translates the characters that it recognizes into a text format. You can then edit the text using a word processing application.

optical resolution—A measurement of how many pixels a scanner actually can detect. The resolution is measured in dots per inch (dpi). It's usually given as two numbers, but it's the first number that's most important. The first number tells how many electronic sensors per horizontal inch the scanner actually has. The second number indicates how often those sensors record data in a vertical inch.

pixel—A tiny dot of color in a digital image. When you scan a document, the scanner essentially breaks the image into thousands of pixels and transmits the pixels to the PC. In order to print or display the digital image, you must use imaging software to arrange the pixels in the proper order.

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Digital Cameras

Get Ready For Cameras That Don't Require Computers

Over the past couple of years, digital camera manufacturers have made vast improvements to image quality. Several other initial drawbacks, including limited storage capacity and difficult download procedures, have also been addressed. Prices have simultaneously begun to fall to a level the average consumer is more comfortable with. Many predict that the time for a digital camera boom is finally upon us now that these hurdles have been cleared.

"With falling prices, increasing quality and resolution, and new applications, digital cameras have begun to attract the attention of the average consumer," says Kevin Kane, an analyst with International Data Corp. (IDC).

According to a study released by IDC late last year, worldwide digital camera shipments will reach 4.7 million this year, growing to 22 million shipments by 2003. Annual digital camera revenues are expected to increase 25% each year. By 2003 the market will account for \$6.4 billion in sales, according to the study. As you consider whether you're one of the millions poised to buy a digital camera, here's what to look for and what to avoid in the digital camera arena.

■ **What's Hot.** More megapixels, fewer dollars. Many companies have realized that in addition to e-mailing photos to family and friends, consumers also want to print photos, and that requires better resolutions. Unlike lower-resolution 640 x 480 cameras, which are fine for Web work and e-mail, today's 1,152 x 872 or 1,280 x 960 cameras pull in enough detail to look good even after enlarging and printing. These high megapixel models are becoming the hottest-selling digital cameras.

Not only are digital cameras becoming better equipped, but they're also coming down in price. Last year the highest-quality megapixel cameras, or those offering images over one million pixels, were priced at more than \$1,000. As we go to press, two megapixel digital cameras are hitting the market at that price. This will drive one-megapixel cameras to less than \$400. According to a report by Cahners In-Stat group, these price drops will eventually result in \$40



entry-level low-resolution cameras with integrated chips. "The main factors in the steep price decrease are improvements in manufacturing capabilities, the development of economies-of-scale and the decreasing cost of components such as sensors and memory," said Kane.

Improved storage. Digital camera users often complain that limited storage capacity

limits their enjoyment of the product. After all, when you're on vacation it's not always easy to find a PC to download the images you've already taken so you can take more. Therefore, it's important to look for a camera that has enough storage capacity to meet your needs.

New storage methods that are easy to use and offer increased capacity beyond the traditional diskette, which can usually only store approximately 17 high-resolution images, are hot. IBM, Sony, Microsoft, Intel, and Iomega have all stepped up efforts to devise alternatives to the diskette that simplify storage of large digital image files. For instance, IBM recently introduced its 340 megabyte (MB) Microdrive. The Microdrive is small enough to attach to a camera and capable of storing 400 high-resolution images.

Late last-year Panasonic introduced a digital camera that stores up to 1,500 images. The PV-SD4090 PalmCam is Panasonic's first camera to save images to a 120MB LS-120 disk and capable of storing up to 1,500 digital images per disc, according to the company. However, to read a SuperDisk, you need a SuperDisk drive, which retails for about \$200. SuperDisks themselves each cost about \$10. Be sure to read the fine print and look for such hidden costs when examining new storage methods.

Sony's Mavica camera has been the best seller among digital cameras every month for the last year despite its \$800 price tag, according to PC Data. However, it still utilizes cheap diskettes that can be inserted directly into PCs.

Sharing. Several companies are offering digital camera extras such as digital photo organizing, sharing, and finishing services. With these services, users can establish Web-based multimedia photo galleries, then invite friends and family to view or download the contents. One such company is Club Photo; it plans to release software to permit Palm devices to double as photo albums. The company said the images could then be beamed to other PalmOS devices via built-in infrared ports.

What's HOT

- Less complicated with more storage
- Cheaper prices
- Integrated services

What's NOT

- Large cameras
- Alkaline batteries
- Complicated digital imaging procedures

What's NEXT

- Palm-sized PDA-interfacing cameras
- Cameras that don't require computers
- USB and FireWire
- Cameras bundled with PCs

The line between digital handheld cameras and digital PC cameras (the ones that sit atop your monitor) is blurring. Intel continues to be a strong force in the latter group, especially with its new PC Camera Pro Pack. The camera has built-in connections so users can capture images from camcorders or VCRs without purchasing a separate card. Also included are several software programs for sending images via e-mail, building Web pages that can include snapshots that are taken and posted automatically, and creating movies or presentations that have digital images. Intel's strategy illustrates another hot trend in digital cameras. This makes them more useful and flexible for the average consumer.

■ What's Not. Big cameras. Digital camera makers are taking note as the market for laptops and personal digital assistants (PDAs) expands. Cameras are getting smaller and easier to keep in the palm of your hand; larger cameras are definitely out.

Last September, Casio introduced a digital camera add-on card for its Cassiopeia E-100 and E-105 handheld computers. Priced at \$299, the card allows Cassiopeia users to take still pictures or short movies. Shortly after that, Handspring introduced the Visor, a sub-\$200 handheld device capable of upgrading to a digital camera with an add-on cartridge. We expect the market for such small camera devices to take off in the next few years.

Alkaline batteries. Battery life continues to be one of the biggest problems surrounding digital cameras. Cameras with LCD panels tend to be the biggest battery drainers. For maximum enjoyment of your camera, choose a battery that has a long life. Those that operate on rechargeable Ni-Cad or Lithium batteries are highly recommended. Alkaline batteries are out.

Complicated procedures. Another big complaint among digital camera owners is the unwieldy process of connecting the camera to a PC, downloading images one at a time, and saving each to the hard drive. Several digital camera makers are focusing their energies on improving this process. For example, the Casio QV-8000SX digital camera includes Casio's new Photo Loader software. Photo Loader automatically transfers entire batches of images

to either a Windows or Macintosh computer via the Universal Serial Bus (USB) cable or CompactFlash memory card. Additional methods of easy and fast transfer will be big consumer favorites.

■ What's Next. Soon, nearly all cameras will use USB ports for connection rather than serial or parallel ports. By the end of this year, analysts say 80% of digital cameras will be

USB-compliant, with many higher-end models migrating to the IEEE-1394 (FireWire) connection scheme after 2000. If your computer doesn't have USB, you may need an upgrade to continue in digital imaging.

Taking a design cue from other PC-less products, such as information appliances and dedicated photo printers, Lexmark introduced the Kodak PM100. In addition to a standard parallel cable interface, this 1,200 x 1,200 photo inkjet printer has

slots for CompactFlash and SmartMedia cards. Users just slip the memory card out of the camera and into the PM100, print an index sheet, and then choose which photos to print in full size. To make it even more appealing, the printer is retailing for only \$199. More of these devices are likely to appear as manufacturers continue to attempt to attract non-PC users to PC-type tools.

In an effort to counteract that trend, PC companies will increasingly bundle digital cameras with their computers. Microsoft and Intel have both begun focusing their efforts on expanding the popularity of digital imaging as a way to drive sales of high-end computers and software. Late last year, Microsoft said one of its major reasons for retooling Windows 98 into Windows 2000 is to include enhanced support for digital imaging. Meanwhile, Intel executives are betting increased interest in digital imaging will help drive sales of high-end computers with Pentium III processors, which incorporate special codes to maximize audio and video performance.

Simplifying the process of connecting the PC to the camera and making the download process easier are key ways of making digital imaging more appealing to PC users. Those



Terms To Know

compression—Most cameras save files using Joint Photographic Experts Group (JPEG) compression, which can shrink images to a fraction of their original size without heavily impacting image quality. Some cameras allow users to set the amount of compression used; this is a handy feature when quality is critical.

liquid-crystal display (LCD)—Many digital cameras today come equipped with LCDs. These are screens that allow the user to see the image they are photographing before actually taking the picture. The photographs can also be played back and viewed through the LCD panel before being downloaded to a computer.

resolution—Resolution and lens type affect the quality of the image. Many computer monitors are set to only display 640 x 480 pixels, which is the same number of pixels many low-end digital cameras provide. While this looks great on a monitor, it's not enough for printing. To output a 4- x 5-inch photo at 133 lines per inch, you need at least 1,024 x 768 pixels. While most digital cameras are capable of resolutions from 0.8 to 1.8 million pixels, most of them can also store images at lower resolutions, which uses less memory per image. Most digital cameras can store only five to 10 images at high resolution but can easily squeeze in 40 or more at reduced resolutions.

storage capacity—The number of images a digital camera can store is determined by image resolution, image compression, and the specifications of the memory media. Most cameras use removable memory cards ranging from 2MB to 170MB, which will hold anywhere from 12 to 120 images or more depending on resolution and compression. Once the memory is full, images must be downloaded or deleted to make room for more.

areas are likely to be where digital camera manufacturers will focus their efforts this year and next. **1A**

by William Van Winkle

Projectors

Smaller Machines & Improved Images Dominate The Market

The road warrior salesperson's list of must-have hardware has grown in recent times. The portable computer has been a staple for several years, but it's no longer alone in the briefcase.

Salespeople who want to give presentations using their portable computers know multimedia components are a necessity. But viewing the presentation on a small portable computer screen is frustrating.

Enter the liquid-crystal display (LCD) projector, which lets you display your presentation on a large screen with ever-improving quality. Dozens of companies manufacture projectors, and the available options are increasing quickly. We'll discuss the trends occurring with projectors to help you pick the unit that will best serve your needs.

■ What's Hot. Two trends are dominating the projector market—smaller, lighter-weight machines and improved projection images. Much as portable computers have consistently squeezed more power and better performance into a smaller package, projectors are following the same pattern.

The basic projector today is on par with the upper-end models from a few years ago.

"It is impossible for any model to remain at the top for more than about six months," says Steve Lemoine, president of Lion Multimedia Services of Slidell, La., a computer projection company that specializes in high-resolution display. "It's almost as bad as computers. The competition is so fierce, and the technology is so dynamic."

Several new models are being introduced that push the level of competition to the

extreme, offering powerful, small projectors that are easy to set up and use. Sony recently introduced an ultraportable LCD projector, called the VPL-CS1. It offers a zoom lens and weighs 6.4 pounds. The Compaq MP1600 projector weighs only 4.2 pounds and, because of its innovative



tower configuration, it has an extremely small footprint, while the InFocus LP435 weighs only 7.4 pounds.

The MP1600 and the InFocus LP435 both use newer Digital Light Processing (DLP) technology rather than LCD. LCD is the dominant display technology available in projectors now, but DLP is a technology developed by Texas Instruments designed to provide sharper

images for projectors in any lighting conditions. DLP is steadily grabbing more of a market share because of its image clarity.

■ What's Not. Projectors are extremely expensive pieces of equipment. The Compaq MP1600, for example, has a suggested retail price of \$4,499. Few newer projectors cost less than \$3,000. You'll pay more than \$10,000 for high-end models, such as the Sony VPL-PX30, which costs \$11,990. The VPL-PX30 offers 2,400 lumens measurement and extended graphics array (XGA) resolution, making it a powerful LCD projector for use in a variety of situations.

The high cost of projectors is probably their biggest drawback. Because of the high cost, many companies now lease or rent projectors.

If you're thinking of saving money by purchasing an older projector, you'll probably be disappointed. Because of the technological improvements that have occurred in projectors, older projectors probably aren't going to serve your needs well.

For example, today's projectors have a standard lumens (or brightness) measurement of between 600 and 1,000, which is two to three times better than the standard lumens measurements of only a few years ago.

Lamp life spans have also increased tremendously. Older projectors may use older filament lamps that might burn out with only about 50 hours of use. Newer lamps should last a minimum of 1,000 hours.

Older projectors often used cathode-ray tube (CRT) technology. CRT projectors are still available, but they're mainly used in settings where they won't be moved and where room lighting can be closely controlled. Because of their portability and overall flexibility, LCD projectors usually are the choice for most customers, although DLP is grabbing attention and market share.

Resolution is an area in which improvements are still coming. Each LCD projector

What's HOT

- Ultraportable units
- Solid image quality
- Brighter images
- Renting or leasing high-priced units

What's NOT

- Bulky, nonportable units
- Lamps using filaments and halogen lamps
- Bundled projector/portable computer packages

What's NEXT

- Long lamp life
- Digital Light Processing technology
- Lightweight units generating better images
- Compatibility with a variety of hardware

has a native resolution, which is the default (and best) resolution under which it operates. Newer projectors can accept a variety of resolution levels; this is sometimes called intelligent compression technology or automatic image interpolation. Images displayed at resolutions other than the projector's native resolution typically aren't as clear as native resolution images. Consequently, an expensive XGA resolution projector displaying a super video graphics array (SVGA) resolution image from your portable computer won't give you the sharpness you desired when purchasing an XGA resolution projector.

Intelligent compression technology in LCD projectors still isn't perfect; as it continues to improve it will become a vital component.

■ **What's Next.** Industry analysts continue to see improving image quality among future projectors while the size of the case continues to shrink. As the number of choices increases, those who use the projectors will have more luxury in choosing a model that exactly meets their needs. Lemoine says the increase in options means it's vital that users have at least a basic idea of how they'll use the projector before deciding on a model.

For instance, traveling salespeople may feel weight is a key factor, especially if they're lugging the projector between companies and on airplanes. High image quality will be most important to those who will use the projector for detailed images, such as spreadsheets. If several different people will be using the same projector with several different input devices, choosing a flexible, easy-to-use projector will be most important.

Some of the newest projectors available on the market are focused on providing flexibility, especially in the type of hardware that can be used with the projector. Newer projectors are being equipped to handle input not only from computers, but also various other types of hardware, such as digital versatile discs (DVD) players and VCRs. More projectors



Compaq MP1600



InFocus LP435

will contain valuable additional features as part of the basic package—rather than as a higher-priced add-on package—such as remote control, a zoom lens, audio speakers, and the ability to connect two or more input devices simultaneously.

"I am just seeing a real maturing of the current technologies and designs, longer lamp life, reliable LCD and DLP engines, good image handling, and good remotes," says Lemoine of newer and yet-to-be-released projector models.

The choice between LCD and DLP technology

is going to become more difficult in upcoming months, too, as more manufacturers offer DLP projectors.

DLP uses tiny mirrors on a special microchip to produce extremely sharp images with realistic color, regardless of the lighting in the room. Another one of DLP's advantages is its ability to reduce the overall weight of the unit without sacrificing image quality. However, DLP projectors tend to operate at higher temperatures and with louder cooling fans than LCD projectors. Lamp life in DLP projectors is often shorter, and DLP projectors usually cost slightly more than similar LCD projectors.

With all of the changes that are occurring and will occur in projectors, it's tempting to put off the purchase in an attempt to avoid buying a unit that will be out-of-date soon after you take it out of the box.

But following such a strategy is akin to trying to time the stock market. It just doesn't work. While you've been standing on the sidelines, watching the changes occur, you've missed months of using the projector and taking advantage of its benefits. You'll be better off determining the features you must have and trying to purchase the best projector you can while remaining within your budget. And the more future trends you can incorporate into your purchase, the longer life your projector will enjoy. [E]

by Kyle Schurman

Terms To Know

brightness variance—The difference between the brightest and dimmest spots when an all-white image is projected; measurements closest to 1 are the best.

contrast ratio—The difference between white and black in the projector's image; larger ratios yield better-quality images.

Digital Light Processing (DLP)—A newer technology designed for projectors to give sharp images, regardless of the lighting in the presentation room.

extended graphics array (XGA), 1,024 x 768—IBM's upgrade to the VGA video card. As the use of XGA-resolution notebook computers increases, XGA projectors will become more popular.

lumens—The measurement of brightness in a projected image; larger measurements yield better-quality images.

native resolution—The default resolution for a projector.

pixel—A single element in a picture. The more pixels used, the sharper the image.

resolution—The sharpness of an image measured by the number of pixels available; larger numbers yield sharper images.

super extended graphics array (SXGA), 1,280 x 1,024—High-end users will want SXGA resolution for detailed images, but SXGA projectors are expensive.

super video graphics array (SVGA), 800 x 600—The most popular resolution available for projectors.

ultra extended graphics array (UXGA), 1,600 x 1,024—Few projectors run at UXGA resolution; it's only for the most detailed images.

video graphics array (VGA), 640 x 480—The lowest resolution on the projector market; VGA projectors are usually the least expensive.

Sound Cards

Positional Audio Lets You Immerse Yourself In Sound

If you're a fan of high-quality computer audio, the squeaks and beeps once produced by common speakers didn't leave you much to be excited about. A few years ago, though, PC audio started to grow up, and it promises to never be the same again.

Today's audio options for your PC are almost mind boggling. We'll discuss the trends in computing audio, including changes to speakers and sound cards.

■ **What's Hot.** Several features have been introduced to computer audio in the past few years, working together to create high-quality audio through the PC.

Perhaps the biggest change has come with the introduction of Peripheral Component Interconnect (PCI) sound cards. By using the PCI bus, which offers vastly improved data-transfer speed over the Industry Standard Architecture (ISA) bus, improvements in audio quality were possible.

PCI sound cards also contain Digital Signal Processor (DSP) chips, which improve sound quality and overall system performance by executing many of the calculations required for audio previously done by the computer's microprocessor.

Creative Labs, the market leader in sound cards, has been quickly rolling out new products over the past three years to keep up with the new technology. For instance, says Stan Kwong, Creative Labs audio product marketing manager, the Sound Blaster AWE 64 was the market standard three years ago. It was an ISA card with support for two speakers, 64 voices, and analog input/output.

Since then, though, Creative Labs has reconfigured its Sound Blaster line of sound cards. Its standard now is Sound Blaster Live! Platinum, which is a PCI card with digital input/output and support for several speakers. Live! Platinum supports 1,024 voices.

With the increased power on the sound card, positional audio has come to the fore-



front. Positional audio, also known as 3-D audio, uses multiple speakers and powerful sound cards to make it seem as though the audio has surrounded the user. Positional audio is especially popular within gaming software. It also works well with videoconferencing in a business setting, where each participant can have his or her audio come from a

different position, making it easier to determine who is speaking.

Two types of positional audio are in use now. In one type, four or five speakers are placed around the user, and they're used with a sound card that supports multiple speaker connections. For users who don't want four or five speakers, though, the sound card and software can work in tandem to push 3-D audio through just two speakers.

With all of the improvements in sound cards, high-quality speakers are beginning to join the fray. Speakers that are closer to stereo quality are more commonly found with PCs, says Woody Jackson, vice president of sales and marketing for Sonigistix, which makes Monsoon Multimedia speakers, including the MM-700's unique design shoots sound in front of and behind the speaker.

"PC speakers have largely been a collection of low-cost cones and domes that made noise on the desktop," Jackson says. "New speaker technologies, such as those from Monsoon, actually rival the audio quality of esoteric living-room speaker systems."

■ **What's Not.** Those users saddled with older sound card technology, such as an ISA sound card, are missing out on many of the recent breakthroughs. And if you've purchased a new sound card, but you're using it with the speakers that shipped with your computer, you probably aren't taking advantage of the sound card's benefits.

Putting up with sound distortion isn't required anymore, either. New protocols have reduced the acceptable levels of interference caused by the components inside the computer.

"Audio chips once had poor audio quality from a high-fidelity perspective, but [they were] adequate for the beeps and squawks that were made by a computer," Jackson says.

What's HOT

- Positional audio
- Peripheral Component Interconnect
- Improved quality
- More voices

What's NOT

- Out-of-the-box speakers
- Industry Standard Architecture
- Distorted sound

What's NEXT

- Continued improvement
- Better speakers
- Flexibility
- Universal Serial Bus audio

"Specifications for audio have become much more stringent over the past several years, though. Signal-to-noise ratios, bandwidth, and distortion specs have improved tremendously."

■ **What's Next.** Not surprisingly, PC audio experts foresee additional improvements in PC audio in the next couple of years, especially in the area of positional audio. Speaker and sound card manufacturers should continue working together to make the audio experience even more realistic and more interactive.

Kwong says game enthusiasts will benefit from continued improvements made to positional audio.

"As gamers continue to look for increased performance and more audio realism in their games, they demand features such as multi-channel speaker support for awesome positional audio," Kwong says.

Kwong also sees additional flexibility among computer audio components and consumer electronics. For instance, musicians

could connect one or several instruments to the PC audio card, giving them customization features, or home users could connect to their stereo through the PC's audio card.

Speaker technology should continue to improve, too, providing better audio experiences through positional audio. New speakers could greatly improve PC audio in the area of Universal Serial Bus (USB) audio.

When using USB speakers, the audio coming from the PC can be converted from digital to analog inside the speaker and away from the noise made by the computer's internal components. Or, if the audio is processed inside the computer, it moves to the speaker on an extremely fast USB connection.

While USB speakers have already been introduced, they still aren't practical. To use them, you need a powerful computer with a fast CD-ROM drive. You also must be running Windows 98, and setup can be difficult. USB



Creative Labs' Sound Blaster Live! Platinum

speaker technology still isn't ready for mainstream use.

That's no big deal, though. With all of the other improvements made to sound cards and speakers, computer audio has never been better. Whether you want an immersive, realistic gaming experience or improved videoconferencing, positional audio is an amazing technology. And we are now only at the tip of PC audio possibilities. **[E]**

by Kyle Schurman

Terms To Know

3-D audio—See **positional audio**.

Application Program Interface (API)—A set of protocols used to create software, guaranteeing the software will work with a particular operating system. Programmers use APIs to ensure compatibility among the software, sound card, and the operating system.

channel—The process of dividing sounds coming through stereo speakers to provide better quality audio. Depending on the audio setup, sound typically is divided between two and five channels. With more channels, you can create more realistic 3-D sound.

digital signal processor (DSP)—A chip installed on a Peripheral Component Interconnect sound card that allows the card to work more

quickly, reducing noise in the audio signal.

FM synthesis—The method by which sound cards create sounds based on actual musical instruments; the sound quality isn't as good as wavetable synthesis.

frequency response—The highest and lowest sound ranges an audio speaker can produce; speakers with a greater range are usually higher quality speakers.

Industry Standard Architecture (ISA)—An older standard by which data was moved from the microprocessor to peripheral components such as a sound card; it's being supplanted by Peripheral Component Interconnect.

Musical Instrument Digital Interface (MIDI)—The process by which a sound card processes

music; music is converted from digital to analog, and vice versa.

Peripheral Component Interconnect (PCI)—A standard developed by Intel to allow the microprocessor and peripheral components, such as a sound card, to communicate more quickly than was possible with Industry Standard Architecture.

polyphony—The number of sounds (also called voices) that the sound card can play simultaneously.

positional audio—The process of simulating three-dimensional audio by channeling audio through multiple speakers in various locations; in positional audio, users can hear a footsteps to their right or an explosion behind them, for example.

root mean square (RMS)—Measures the wattage that

speakers can consistently maintain; it provides a measurement of speaker quality.

signal-to-noise ratio—The measurement of sound clarity; higher measurements (in decibel ratings, or dB) create audio with less noise and distortion; the ratio can be the best measure of a sound card's quality.

voices—The different sounds your sound card can reproduce (not necessarily simultaneously).

Universal Serial Bus (USB)—USB speakers process the audio themselves, lessening reliance on a sound card and reducing noise.

wavetable synthesis (WAV)—Sound created through digital recordings of actual instruments; it offers a better sound quality than FM synthesis.

Video Cards

Rapid Enhancements Keep Hardware Ahead Of Software Demands

The goal of computer hardware developers is to squeeze as much power as possible into their products. Video card developers, then, can be forgiven if they're bragging a little right now; after all, their products have lapped the field when it comes to software products that are able to push their video cards to the limit. Here's a quick rundown of what's happening in the video card arena.

■ What's Hot. If you're a gaming enthusiast, purchasing a new video card every six months has become a ritual. Video card manufacturers typically introduce new hardware with additional power and new features a couple of times a year, making it difficult to know when you should make an upgrade purchase, says Jim Carlton, senior brand manager for Creative Labs.

"It becomes a question of, 'When do you jump into the stream?'" Carlton says. "You have the geeks who jump in every six months, the guys who are super hard-core about gaming, guys like me. I only call them geeks because I lump myself in there. Then you have another bracket of people who generally upgrade once a year; they'll skip one generation of technology."

Those who own the current generation of video cards have pretty much guaranteed their card's technology won't be made obsolete by software demands anytime soon.

"Three years ago, software was extremely demanding, and hardware was not able to keep up with the demands of the software,

but now the tables have turned," says Kamran Ahmed, consumer graphics product manager for Matrox Graphics. "Actually, in the business market and even in the gaming market, there are only one or two titles that actually push the limits of the card."



Many of the newer video cards now contain dozens of features, including two-dimensional hardware acceleration for Windows, eight megabytes (MB) of memory on the card, and true color (16.7 million colors) capability. Running a high resolution, such as 1,600 x 1,200, with true color is now common with the most of the newer video cards.

Support for digital versatile disc (DVD) and three-dimensional rendering have also become key components of the newer cards.

"Those two technologies have probably contributed most to the changes that have gone on in the past two years in graphics cards," Carlton says.

■ What's Not. As video cards continue to reinvent themselves, the baseline level for cards steadily increases. Ahmed says several features that were key a few years ago are no longer the industry standard, including 16-bit color and the Peripheral Component Interconnect (PCI) bus. Video cards that don't meet the new standards—if they don't contain enough memory to run at high resolution with true color, for example—will leave their users frustrated.

"As a baseline, everybody needs high resolution, high refresh rate, high color," says Ahmed. "I don't think many users like to run in 16-bit color anymore, and nobody runs in 640 x 480 resolution anymore."

Still, support for those older features probably won't go away anytime soon because software developers tend to include backward support in their products, allowing them to work with any type of video card configuration.

Even as video cards continue to push the limits, Ahmed says he thinks the number of users who are willing to upgrade their video cards—outside of the gaming enthusiasts—will be shrinking because users instead will choose to upgrade the entire computer system.

One disappointing area for video card manufacturers is the narrow segment of the industry to which their new technologies appeal. For instance, while gamers enjoy and rely on the 3-D performance delivered by the latest video cards, business users can't find a good reason to use 3-D.

What's HOT

- More features
- 3-D
- True color
- Easy upgrades

What's NOT

- Business applications
- Cutting-edge software
- Less than four megabytes of memory
- Upgrading

What's NEXT

- More of the same
- Support for digital versatile discs
- Support for multiple monitors
- Support for high-definition television

"I've never been of the mindset that there's a killer business application for 3-D," Carlton says. "There have been some really neat data visualization tools, but they're just not broadly used. They're killer for engineers, they're killer for specific types of analysts, but for your general business desktop with 3-D, I don't know that anyone is going to stumble across anything."

■ What's Next. Within the video card industry, it often seems as though "what's next" is already here. There are, however, several improvements expected to become industry standards in the next few months and years.

DVD. Both Carlton and Ahmed expect new video cards to handle DVD entirely, eliminating the need for additional DVD hardware. Purchasing a video card that offers DVD support can help users ensure their card will stay current longer, Carlton says.

High-definition television (HDTV). Support for running HDTV isn't far off, either, mainly because the cards already offer support for digitized signals.

Additional 3-D support. More and more of the calculations required for rendering 3-D images will be performed by the video card, freeing the computer's microprocessor to perform other tasks. Creative Labs' 3D Blaster Annihilator Pro is already beginning to meet these needs. The need for high-performance computer microprocessors designed to handle 3-D calculations will become far less, Carlton says.

Additional monitor support. Ahmed says upcoming video card releases will need to expand the type and number of monitors they can easily support. For instance, flat-panel monitors are going to grow in popularity, meaning video cards must support them. Also, more users will have more than one monitor in their home or business, meaning video cards will support more than one monitor at a time. Cards in Matrox's Millennium G400 series let you send output to a monitor and a television simultaneously, for instance.

All of the improvements focus on one task: adding new features to the already-powerful video cards. Don't expect video card manufacturers to rest as they wait for software to take advantage of the features and power already available.

"Obviously performance is going to keep growing; that's a given," Ahmed says. "But I

think the importance of performance is going to be a little lower than in the past because software is still catching up to performance levels. What you'll see is more features being supported to use that extra horsepower.... Game developers are going to push the envelope to get realistic games that try to represent reality and therefore broaden the appeal of these games to a mass market." **LS**

by Kyle Schurman

Creative Labs' 3D Blaster Annihilator Pro



Matrox's Millennium G400



Terms To Know

Accelerated Graphics Port (AGP)—Graphics cards that provide speeds up to four times faster than Peripheral Component Interconnect cards.

Application Program Interface (API)—A set of protocols used to create software, guaranteeing the software will work with a particular operating system. Programmers use APIs to ensure compatibility between the software, video card, and the operating system.

color depth—The number of colors a video card can display.

dynamic random-access memory (DRAM)—A type of memory found on older video cards; it has been surpassed in speed by synchronous dynamic RAM and synchronous graphics RAM.

frame buffer—The area of memory on a video card where an image is stored until it is sent to the monitor.

graphics accelerator—A video card that contains its own graphics coprocessor, which all newer video cards have. The term is often used interchangeably with video card.

Industry Standard Architecture (ISA)—An older standard by which data was moved from the microprocessor to peripheral components, such as a video card; it has been supplanted by Peripheral Component Interconnect.

Peripheral Component Interconnect (PCI)—A standard developed by Intel to allow the microprocessor and peripheral components, such as a video card, to communicate more quickly than was possible with Industry Standard Architecture.

synchronous dynamic random-access memory (SDRAM)—The type of memory commonly found

on today's graphics cards; it's faster than dynamic RAM (its predecessor) but slower than synchronous graphics RAM.

synchronous graphics random-access memory (SGRAM)—Another type of memory commonly found on today's graphics cards; it's faster than synchronous dynamic RAM, but it's also more expensive.

true color—A display containing about 16.7 million colors; this is a common support level for new video cards.

video card—A general term referring to the circuit board inside a computer that translates the microprocessor's signal for output to the monitor. Also called video adapter, video board, video display board, graphics accelerator, graphics adapter, or graphics card.

The Internet & Web

Stay Tuned For Broadband,
Personal Web Addresses & Sales Taxes

When it comes to personal computing, the Internet is what's hot. The Strategis Group recently announced that the number of adults in the United States using the Internet recently topped the 100 million mark—and for good reason. Whether your interests are shopping or music, communication or high-speed access, these are exciting days to be online.

The World Wide Web grabs most of the attention. Web addresses roll off the tongues of almost everyone these days and dot-coms are plastered on everything that takes ink. We'll talk about the Web, but its plainer older sister, the e-mail account, is still the quiet star.

■ **What's Hot.** Most people who have e-mail can't imagine living without it; they dash off quick, free messages to plugged-in co-workers, friends, and family around the world. The average Internet user sends 6.4 e-mails each day, according to the Strategis Group, and 77% of Internet users send messages with file attachments at least once a week.

People are getting used to expressing themselves at the keyboard. A commentary in *The New Yorker*, which is unique for its staunch refusal to put editorial content online, even called e-mail "the literary event of the late century," noting that people are paying attention to their sentences and renewing long-lost friendships.

Once hooked, users find that one account isn't enough. Messaging Online estimates that 270 million mailboxes serve users in the United States, with an average user having 2.5 addresses: one-half of an e-mail account that comes with home Internet access (perhaps

shared with a spouse or other family member, accounting for the other half), one account for work, and one Web-based account.

These Web-based or "Webmail" accounts are taking off, as people find out how portable they are and how private compared to company e-mail accounts monitored by supervisors. Long-time favorites Hotmail (<http://www.hotmail.com>), Yahoo! Mail (<http://mail.yahoo.com>), and a slew of others let users send and receive e-mail at any computer with Internet access and a Web browser.

A newer type of Webmail service acts as a complete communications center, where users can send and receive not only e-mail but also faxes and voice mail or voice e-mail. Take, for instance, onebox.com (<http://www.onebox.com>).

This free service gives users a telephone number where people can leave voice mail or send faxes. Users can check voice mail the old-fashioned way (by dialing the phone) and find out how many e-mails and faxes await them online. At the Web site, they can read and send e-mails and faxes. If they have a sound card and speakers, they can listen to voice mail messages, and if they have a microphone they can send voice e-mails.

But enough about communication. Lately, the most-talked-about aspect of the Internet has been shopping. Research company eMarketer projected that consumers would spend \$7.3 billion buying merchandise online during the 1999 holiday season, up 121% from the year before.

What's HOT

- E-mail
- Web-based communication
- Shopping
- Music

What's NOT

- Analog modems
- Sloppy Web sites
- Browser wars
- Privacy violations

What's NEXT

- Sales tax debate
- New payment methods
- <http://www.yourname.com>
- Widespread high-speed access

That's still pennies in the Christmas bucket, but online retailers are optimistic, as anyone who watched television or read a magazine last December could tell. Every other ad, it seemed, was for a dot-com. Online merchants want consumers out of the malls.

Sites are getting more aggressive, using a variety of features to lure consumers online and keep them there. Following online bookseller Amazon.com (<http://www.amazon.com>), which Web creator Tim Berners-Lee has called "the classic model of e-commerce," many shopping sites have established log-ons to keep track of customer information, which makes purchasing quicker and lets stores make recommendations based on past selections.

Some online shops also offer financial incentives. Outdoor outfitter REI (<http://www.rei.com>) has given free shipping and gifts to those who order online rather than on the phone.

Meanwhile, Kozmo (<http://www.kozmo.com>) has brought courting the impatient to new levels. Need to have a movie, a pint of Ben & Jerry's, and the latest copy of *Entertainment Weekly* within an hour? In New York, Seattle, Boston, San Francisco, and Washington, D.C., Kozmo can do it.

Other stores focus on advantages the Internet has over catalogs. Lands' End (<http://www.landsend.com>) has a "shop with a friend" feature that lets shoppers on separate computers browse together, and women can create an online figure based on their dimensions, then try on outfits. The store also offers online chat with customer service representatives.

When it's time for a break, the Internet is appealing to users' ears, thanks to a growing number of radio stations broadcasting over the Internet and to MP3, which is arguably the fastest-growing file format for sharing music over the Internet. Users are tuning in online, downloading free samples, and purchasing entire albums in digital form for play either on computers or portable players.

MP3 players, most notably ones from Diamond Multimedia (<http://www.diamond-mm.com>), have been among top sellers for months. The 32 megabyte Rio PMP300, which we've seen priced under \$130, can store up to 60 minutes of digital sound and run for 12 hours, skip-free, on a single AA battery.

Sean Wargo, Internet analyst at PC Data, says the Internet is a great way for independent labels and small markets to promote music because listeners with specific tastes can find what they want. "They can get a lot more exposure to an audience who's looking for

access already have some kind of high-speed access. Figure in that even more business users do, and it starts to become clear why most Web pages are tediously slow when downloaded with a traditional modem. Web designers and developers are taking advantage of the fact that analog modems are on their way out. Are they still useful? Yep. Worth talking about? Hardly.

Designers are targeting sites for only two Web browsers these days, and you probably know their names. Zona Research, which started studying the Web browser market in 1996 when there were nine players, announced the "end of an era" in November 1999. There are now just two browsers in the race, Microsoft Internet Explorer and Netscape Navigator, and Zona officials say the emphasis has moved from browser technology to content.

With designers pushing for sites that get attention, companies are pouring money into site development. This is serious business. With the proliferation of professionally designed sites and with even low-end Web-page creation software bundling spell-checkers, gone are the days when page creators could get away with typos or glaring grammatical errors—if they ever existed.

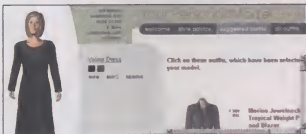
With all the talk about Internet fraud and unreliable information on the Web, consumers have their heads up for any sign that something may be amiss. And if a site's creator hasn't gone to the trouble of spell-checking, why should users go to the trouble of reading the site, let alone trusting it with a credit card number?

Of more serious concern are privacy violations. Profiling software can track what a Web user does online, and many sites require users to fill out extensive forms to access information or order products. What companies do with the information they gather, and what they tell consumers they do, is making an increasing number of Internet users leery, even though they may enjoy the streamlined shopping or targeted content these features provide.

In one widely publicized example, RealNetworks, which is known for its audio and video players offered at <http://www.real.com>, admitted to gathering personal data about music preferences of users of RealJukebox 1.0. In a press release, Chairman



Popular Webmail accounts are evolving into services that also include fax and voice mail service, such as onebox.com.



Online stores are trying to lure shoppers with features catalogs can't offer, such as Lands' End's models based on customer dimensions.

particular kind of music," he says. "It's almost more direct marketing than you'd get on the radio."

While the industry works out problems with people pirating files, fans are busy listening to the radio through their computers at work or downloading music from sites such as RioPort (<http://www.rioport.com>), Launch (<http://www.launch.com>), and MP3.com (<http://www.mp3.com>).

■ What's Not. MP3 and other compression technologies have reduced download times, but they still push the limits of traditional analog modems, even the fastest ones, which function at 56.6 kilobits per second. The answer to the analog speed limit is broadband access, usually in the form of cable modems, which use the same wires that bring users cable television or Digital Subscriber Lines, which use common copper telephone wires. Not only do broadband technologies let users speak on the phone while online, but they also allow data transmission in a fraction of the time.

According to International Data Corp., one-third of American households with Internet

and CEO Paul Glaser announced that RealNetworks had made a mistake "in not being clear enough to our users about what kinds of data was being generated and transmitted by the use of RealJukebox." In the face of lawsuits regarding privacy and fraud, never mind the bad press, the company launched a consumer software privacy initiative.

USA Today reported that such high-profile examples show that although shoppers are getting used to using credit cards online, they are more concerned about the use of personal information. The Federal Trade Commission told the newspaper that public outcry over such events indicates that the industry is regulating itself.

TRUSTe (<http://www.truste.com>) and the Better Business Bureau's BBBOnline (<http://www.bbbonline.org>) are working on privacy seals for Internet businesses, and consumers can visit sites such as Junkbusters (<http://www.junkbusters.com>) and the Electronic Privacy Information Center (<http://epic.org>) to learn about protecting their rights.

■ **What's Next.** Privacy isn't the only contentious legal issue as governments struggle to decide what kind of controls they will place on the Internet. As e-commerce grows, states and local governments are wondering if and how they can collect sales tax on online purchases.

Advocates of online sales tax say local stores can't compete with tax-free online stores and that the loss of revenue hurts local governments, while opponents counter that the Internet is a fledgling industry and that widely disparate tax laws across the country make it difficult to figure sales taxes.

According to the *Detroit News*, year 2000 Michigan state income tax forms will include a new line for reporting purchases from companies that don't collect remote purchase tax, including many online shops. The paper also reports that 45 states have such a tax, although state treasury officials do not know of any other state that has added such a line item on tax forms.

In 1998, Congress passed a three-year moratorium preventing states from creating new taxes on the Internet while an electronic commerce committee explored the issue. Until then, states can only collect on laws already existing, and the debate is sure to heat up again when the committee releases its findings.

All signs point toward consumers spending more money online, but exactly how they will do so remains to be seen. Almost all online purchases are made with credit cards. Although consumers voice concerns about credit card fraud, the system works pretty well for large, occasional purchases. But what about smaller purchases such as articles at research databases or digital music or video files?

Several companies have stepped forward with solutions. Qpass (<http://www.qpass.com>) allows members' online purchases to be charged to a credit card once per month, rather than in bits and pieces. With iPIN (<http://www.ipin.com>), online purchases get added to the customer's monthly Internet access fee. echarge (<http://www.echargecorp.com>), on the other hand, lets consumers charge goods to their telephone bill. It will be interesting to watch the offerings of these companies and others, available through an increasing number of merchants, develop.

Meanwhile, Web users will grow increasingly discontented with long Web addresses, even for personal Web pages, and start to register their own domain names. Low-end Web-hosting packages that include domain name service have dropped to the \$20 to \$25 per month range, plus the annual domain name fee of \$35. With such affordable prices, lots of home users and small businesses most likely will be unveiling their own <http://www.yourname.com> sites.

Broadband technologies will really begin to take off in the not-so-distant future, too, as prices drop and service is offered in more parts of the country. But first, says Amy Harris, research analyst for IDC's Residential and Small Business Telecommunications Services programs, there will need to be a "killer app" that requires broadband Internet access. In turn, more home broadband users will spark the creation of more media-rich sites and programming.

In terms of content, "there is nothing out there that's making them (consumers) say, 'We have to have it now,'" Harris says. "Once that comes along, we expect to see it come along more quickly. . . . It will take something like a Pokémon, something that's really compelling to consumers, and I don't know at this point what that will be; I just know we haven't seen it yet." □

by Sarah D. Scalet

Terms To Know

broadband—A form of data transmission in which several data streams are sent simultaneously over common communications lines such as telephone or cable wires. The result is Internet access that's much faster than the traditional telephone dial-up method, and users can talk on the telephone while online.

domain name registration—The process of obtaining a unique Web address such as <http://www.yourname.com>. Although many Web-hosting companies take care of registration details and posting the site, users still have to pay \$70 for the first two years and \$35 for each year after that to keep their personalized address.

dot-com—A company that emphasizes its Internet presence, usually one whose official name and Web address both end in ".com".

MP3—Short for Motion Picture Experts Group-1 Audio Layer-3, a format for compressing music files that have near-CD quality sound when played either on a computer or a portable music player. You can download MP3 files (either free samples or entire albums available for purchase) from the Internet.

voice e-mail—Unlike a voice mail that's sent and received using a telephone, a voice e-mail is part of a regular e-mail message. Usually, recipients (who must have speakers and a sound card) click a link that brings them to a Web page where they can play the message.

Web-based e-mail—This type of e-mail account can be accessed from any computer with a Web browser and Internet access. The accounts are usually supported by advertising, so the user pays nothing but may give up some personal information or have ads tacked on to the end of each sent e-mail. Also called Webmail.

TI DSPs.
Where
the future of
digital
photography
is being
developed.



Why do some see the future more clearly? How can it be more easily understood? What is the engine that can take us

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THE WORLD LEADER IN DSP AND ANALOG

 **TEXAS
INSTRUMENTS**

Web Page Design

Keep Your Online Presence Current With Meta Tags, Flash Animation & More

Those of us hammering out Web pages sometimes feel left behind when we take note of all the developments sprouting in Web authoring. As soon as we've mastered one new technology, it seems we should already know three more.

Let's focus on what it really takes to keep your Web presence current over the next year. We'll show you the practical side of the latest Web authoring technologies and software. We'll talk about hot trends, the fads fading out, and the developments set to take hold soon.

■ **What's Hot.** **Dynamic HTML.** You've heard the term Dynamic Hypertext Markup Language (dHTML or DHTML), and although the name implies action, you may be unsure of what it means. That's because DHTML refers to a whole slew of technologies that enable interactivity on the Web, including technologies such as JavaScript and Cascading Style Sheets.

Dynamic Hypertext Markup Language (DHTML) is HTML that changes even after the page has been loaded into a browser. It includes menu items that change colors when the mouse moves over them, a chunk of text that slides across the page, or images that users can manipulate on-screen. We could theoretically call cookies and even tried-and-true tricks such as computer graphics interface (CGI) scripting DHTML, as well. However, DHTML primarily refers to pages that change without having to access a Web server.

JavaScript. Although JavaScript for Web sites has been around for several years, it is



more current than ever on the Web. It now has widespread browser support, and most computers surfing the Web today are robust enough (in terms of system memory) to handle the demands of JavaScript. Furthermore, you no longer need to be a programmer to include JavaScripts on your pages. There are excellent script libraries on the Web that not only provide the code but also instructions on inserting and testing it.

We don't recommend gratuitous use of scripts, but a well-chosen few can improve the usability of a Web site. This is especially true for page navigation. Depending on your site, you might consider a pop-out menu, a menu that floats over the page, or a navigation bar that provides mouseover descriptions of its items.

Cascading style sheets (CSS). Style sheets were devised by the World Wide Web

Consortium, or W3C, (<http://www.w3c.org>) to give Web authors better control over the look of their pages. They are called "cascading" because style sheets can control page presentation at different levels. At the most basic level a style sheet embedded in the <HEAD>

tag of a document can control the page's font style and color, link colors and underlines, and all sorts of attributes for HTML elements. At the far end of the spectrum authors can link entire sites to multiple style sheets, achieve multilayered effects and use scripts to create interactions between layers.

The problem with CSS is browser standardization. The Netscape and Microsoft browsers do not implement all CSS features, and they implement them somewhat differently. Most Web authors who take advantage of this hot technology employ it conservatively and test it carefully.

One way to save creation time (and improve the look of your HTML code) is to use a style sheet to specify the font style for a page. One little bit of code in the document head keeps you from having to add those ugly font tags before and after every chunk of text. The code looks like this:

```
<style type="text/css">
<—
body { font-family: Arial, Helvetica, sans-
serif; color: #FF0000 }
—>
</style>
```

Instead of including the style sheet in each Web page, we recommend that larger sites create a separate text file for the style sheet and link pages to it. The linking code, which is placed in the document header, looks like this:

```
<link rel="stylesheet" href="mystyle.css">
```

Not only does this save you from tweaking every page in the site, it also allows you to

What's HOT

- Flash animation
- Dynamic Hypertext Markup Language
- Meta tags

What's NOT

- Bloated Web sites
- Splash pages
- Minimalist navigation

What's NEXT

- Scalable Vector Graphics (SVG)
- Cascading Style Sheets (CSS) 2 and CSS3
- eXtensible Markup Language (XML)

control page presentation from a central location. If you have a new logo or are tired of ugly text, you can simply change specifications in the style sheet.

It is easy for nonprogrammers to take advantage of these hot technologies. If you haven't already, we recommend purchasing a sophisticated Web authoring tool such as Macromedia Dreamweaver or Adobe GoLive. Packages like these make it a snap to insert DHTML such as mouseovers and style sheets into Web pages.

Vector Graphics. Today most Web authors depend on bit-mapped images to add illustrations to their pages, typically Graphic Interchange Format (GIF) and Joint Photographic Experts Group (JPEG) files. These images are built from a static pattern of dots, which means they don't resize well.

An emerging trend in Web graphics today is vector graphics. These images use geometrical formulas to represent images; mathematical instructions for rendering an image instead of the actual image itself. Vector images can be easily resized and stretched, which makes them more amenable to animation. Vector graphics also look better on the computer monitor and are smaller than bit-mapped graphics, so they load more quickly in a Web page.

While standards committees discuss and define the next generation of vector graphics formats for the Web, one de facto vector standard is already very hot: Flash animation. Unlike animated GIFs, Flash animations fill the screen. They are relatively simple to create with Macromedia's Flash software, and they do not require high-bandwidth connections.

The con is that Flash animations require quality that users download a plug-in, which deters some Web surfers. And while Flash is hot now, it's possible that future vector graphics standards will replace Flash. Until then, we expect the popularity of this format to grow over the next year.

Meta tags. Meta tags are HTML tags that are lodged in the <HEAD> of an HTML document. They help Web search engines index a page's content and list it among similar Web

pages. Although not a new technology, more and more Web authors are adopting meta tags as a way to insure proper indexing of their pages.

There are a handful of meta tags, but the most important are the "description" and "keywords" tags. Use the description tag to include a short abstract of a page in the header of your documents. Many search engines display this text as the site summary. Use the keywords tag to list the most important terms in the site. Search engines use these keywords to match queries to sites that include them.

Here's an example of how meta tags should be placed in a Web page.

```
<HEAD>
<TITLE>Baseball History </TITLE>
<META name="description" content="The
complete history of baseball, including the
great players, teams and rivalries, scores and
statistics.">
<META name="keywords" content="sandalot, Babe Ruth, baseball, Stan Musial, New
York Yankees, great baseball umpires, baseball
movies, Red Sox, Oakland Athletics, Sammy
Sosa, Cuban baseball, Japanese baseball">
</HEAD>
```

Keep in mind that not all search engines support meta tags. And adding meta tags to your site is certainly no guarantee that your site will rise higher in a search engine's list of hits. However, meta tags streamline Web sites for use by search engines, and that makes sites more likely to be found by inquiring Web surfers.

■ What's Not. Bloated Web Images. It is definitely not very beneficial to have big and bloated Web pages that take forever to load. In fact, Vincent Flanders, the mind behind the instructive site, "Web Pages that Suck," (<http://www.webpages thatsuck.com>) calculates that the optimum size of a Web page is 47.8 Kilobytes (KB) including HTML text and graphics.

Squeeze down the size of your site with the aid of

graphics programs that optimize Web graphics. Two popular off-the-shelf programs for this are Macromedia Fireworks 3.0 and Adobe Photoshop 5.5.

Another less expensive way to trim down your graphics is to use Web-based software such as the GIF (or JPEG) Cruncher (<http://www.spinwave.com>) or the GifBot (<http://www.netmechanic.com/accelerate.htm>). Or you can visit Garage (<http://www.websitegate.netscape.com>), which analyzes site download times and provides tools for optimizing Web images at no cost.

Splash Pages. Similarly, Vincent Flanders is just one Web critic who considers the splash page an outmoded design technique. "A splash page is an introductory page that doesn't have any purpose other than to make the site look cool," he argues. "At best, it's only interesting the first time you see it and then it ages faster than bad wine."

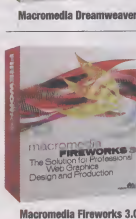
Flanders notes that splash pages also confuse search engines. If your home page contains nothing but an animated graphic, how can the search engine index the content of your site?

Minimalist navigation. Web surfers used to be wowed by artsy-looking sites even if they were difficult to navigate. However, today's Web users are much more information-driven.

Usability guru Jakob Nielsen (<http://www.useit.com>) reports that Web users grow more impatient every year. Among other things, this means we quickly exit those sites with confusing site structure and navigation. Here are some tips for keeping your site easy to use.

- Don't arrange a site by an organizational hierarchy; outsiders will be clueless.
- Arrange menus according to audience needs.
- Don't use menu icons without text labels.
- Use clear language in menu labels.
- Place menus near the top of the page where they're easily seen.
- Include an e-mail link to the Webmaster on every page.
- Include a link back home on every page.
- Make hyperlinks obvious.

Of course, the best way to determine a site's ease of navigation is to test it on users. We recommend that Web authors creating high profile sites to budget time and money for usability testing.



■ **What's Next.** eXtensible Markup Language (XML). A new Web language developed by the World Wide Web Consortium (W3C), XML is a tagging language similar to HTML. But unlike HTML, it enables authors to create their own customized tags and languages.

According to Kynn Bartlett, president of the HTML Writers Guild (<http://www.hwg.org>), XML is the biggest thing coming for next-century Web design. "It's going to change the way we think about the Web and how sites are created," he says.

He explains that in the future we'll store our Web content in XML-capable databases. When a device comes browsing for Web information, it will have a profile identifying the type of content it can use. The server will then send on the requested data in an XML-based language in a format optimized for that particular device, which can be a cell phone, watch, or car dashboard. "I'm excited about this," Bartlett enthuses, "because it opens up the Web to a whole new series of innovations that promote access by everyone, including people with disabilities." XML also offers terrific possibilities for online businesses, which will be able to use XML tags as common ground for trading information such as part numbers, machining specifications, and billing information.

Scalable Vector Graphics (SVG). Above we talked about a trend toward vector graphics as seen in Flash animations on the Web. But the W3C is busy creating a new Web document standard for vector graphics called Scalable Vector Graphics (SVG). All browsers and all computer platforms on the Web will support documents in the SVG format.

SVG is an XML language that incorporates all kinds of hot technologies including Cascading Style Sheets and JavaScript. SVG will allow designers to create sites that look more like two-dimensional magazine pages. We'll be able to set zooms and pans for images, and JavaScript programmers will be able to code complex animations for them.

But you won't have to be a programmer to incorporate SVG into your Web site. Look for this year's releases of office software packages to incorporate SVG support. For Web surfers, this means Web pages will be smaller, faster, and more interactive. The vector-based pages will scale down for small new Web appliances.

Resource Description Framework (RDF). We mentioned using meta tags to

Terms To Know

cascading style sheets (CSS)—Cascading style sheets are a new HTML feature that gives Web developers more control over Web page presentation. Style sheets are documents that define how different elements, such as headings, links, and lists, appear. They also allow for precise positioning of page elements such as graphics.

Dynamic Hypertext Markup Language (DHTML)—This term refers to a set of technologies that allow Web pages to change. It usually refers to changes that take place without interaction with a

Web server; this is not always the case. Examples of DHTML include JavaScript animation and rollover effects and style sheet updates. Sometimes DHTML refers to changes that occur before a page is even loaded, which can depend on a user's browser type, surfing history, or the time of day. Some definitions of the term will include server-dependent changes, such as CGI scripting.

eXtensible Markup Language (XML)—A specification for a new Web language being developed by the World Wide Web Consortium (W3C). As a

tagging language, it is similar in form to HTML. However, unlike HTML it enables designers to create their own customized tags and languages. For example, Web retailers could use XML to create a new language for Web invoices with tags like <price> and <item number> and <shipping>.

meta tags—Meta tags are HTML codes that provide information about a Web page when inserted into a Web page's <HEAD> tags. Meta tags contain information such as keywords and page descriptions. Many search engines rely on Meta tags to index pages.

describe Web pages, but RDF is an even hotter trend that is waiting in the wings. This XML language provides conventional structures for our meta information, so Internet user communities can define their own specific "meta" terms.

For example, if a famous chef wanted to publish an RDF-compatible recipe on the Web, he or she might use a standard "recipe" template with specialized recipe meta tags. The template might include the dish name, cooking time, an ingredient list, and cuisine type. An RDF-capable search engine would index the page with other recipes, making it possible for us to easily locate any number of "Fudge Brownie" recipes and sort them by ingredients.

The specifications for RDF data are set, and some research organizations offer RDF editors, but commercial browser and search engine implementations are slow to arrive. One good example is Netscape's Smart Browsing feature in which Netscape uses RDF and meta tag technology to locate Web page addresses.

■ **What's Next.** Cascading Style Sheets (CSS) are hot today, but new style features found in specification levels two and three (CSS2 and CSS3) will change the way we

experience the Web. With browser support for CSS2, our documents could include dynamically downloadable fonts and page sections devoted to navigation or to sidebars. We might also use aural styles that incorporate speech synthesis into Web documents, which could lead to widespread Web use in our automobiles.

With browser implementation of CSS3, authors will be able to tweak the Web interface with new cursors and colors. In fact, we'll have color profiles to solve the problem of colors that look different on Macs and PCs. Incorporation of Scalable Vector Graphics will allow us to mix text and graphics styles in one style sheet. And we'll be able to use style sheets for attaching behavior scripts to objects, so they react to user events like mouse-clicks and mouseovers.

We hope we've cut through the hype for you busy Web mavens. Stay clear of Web design that inhibits ease of use. This primarily includes fat graphics and confusing navigation. But keep current with the DHTML technologies such as style sheets and JavaScript; they'll fold into future technologies such as Scalable Vector Graphics. [E]

by Marti LaChance

Internet Access

Breaking Free From Dial-ups & PCs

You know by heart the sound of the Internet connection, like an advertising jingle that won't get out of your head: the click before the dial tone, the seven or eight beeps as the computer dials the phone number of an Internet service provider, the squeal of the modem as you enter the world of the Web. But to quote one of those persistent ads, "Change is good."

A fundamental shift is occurring in the way home and small-business users access the Internet. Dial-up connections that tie up telephone lines are on their way out, and the Internet itself is on the way out, too—out of the personal computer and into all kinds of other devices.



■ What's Hot. The hottest topic in Internet access these days is **broadband transmission**, which allows for a much faster, more convenient link to the Internet. According to the International Data Corp. (IDC), in late 1999 one-third of all American households that had Internet access were using some form of high-speed access.

Although neither is available on a national scale, in regions of the United States where the technologies are available, Digital Subscriber Lines (DSL) and cable modems are duking it out to be the provider of choice. As of late 1999, cable modems were winning: 1.35 million American households had cable broadband access, compared to 330,000 with DSL.

To get DSL, which works through common copper telephone wires, Internet users must live in an area that has DSL service and is within a certain distance of the telephone company's central office. And they have to pay for it. After installation, DSL lines cost at least \$30 or \$40 per month, plus Internet service provider (ISP) charges.

You can obtain comparable speeds through cable modems, which use the same lines that bring programming to television sets; although users must live in an area where the cable company has completed the necessary upgrades. Again, the Internet connection doesn't tie up other resources; users can chat on the phone, surf the Web, and watch HBO, all at once. The service usually costs between \$40 and \$60 per month after installation.

Overall, the cable setup tends to be a little less expensive. Jupiter Communications estimates that cable modem users pay on average \$10 less per month than those with DSL.

Cost aside, Amy Harris, research analyst for IDC's Residential and Small Business

Telecommunications Services program, says cable modems have taken off because users are more aware of the technology. "The big question is, 'I know what cable is; what's DSL, and which one's better?' I think there's a lot of confusion right now about DSL."

In the coming year, DSL and cable modem service will be rolled out in more parts of the United States, and prices are likely to drop as competitors fight for customers. Future talk centers not on whether broadband will take off, but on which form it will take. We're talking racing terms.

"Cable has a head start over DSL," Harris says, "and we expect to see that gap continue until about 2002, 2003." IDC predicts that DSL will have a slight edge on

the market by 2003: 9.3 million compared to 9 million. She says DSL marketing will get more aggressive as the cable modem industry busies itself working on upgrading to two-way cable lines so more people are eligible for the service.

But slower speeds aren't necessarily such a bad thing for access on the go. Anyone shopping for a modem for a portable computer will find plenty of wireless options. Novatel Wireless (<http://www.novatelwireless.com>) recently released one called the Merlin Type II Wireless IP modem, which claims to be the "ultimate in mobile computing," and it functions at 19.2 kilobits per second (Kbps).

A variety of handheld devices with wireless Internet access are also courting the road-warrior types. Take the Palm VII (<http://www.palm.com>). The newest version

What's HOT

- Regional Digital Subscriber Line service
- Regional cable modem access
- Wireless personal digital assistants and modems

What's NOT

- Non-V.90, non-Universal Serial Bus modems
- WebTV
- Integrated Services Digital Network

What's NEXT

- Wireless devices
- National, high-speed Internet access
- Internet-ready household items

But enough about PCs already. The Internet is breaking out of the PC, as all kinds of appliances and handheld devices get wired.

of 3Com's wildly popular personal digital assistant (PDA), which just got bumped down to an estimated street price of \$499, has a built-in wireless modem. Users who live in the right area can use the Palm VII to send and receive e-mail anytime. For Web access, the Palm VII uses Web clipping, rather than a whole Web page, from which users can request specific information, such as news, weather, and movie times.

Although such devices haven't quite taken off in the consumer market, they're starting to draw lots of longing glances.

■ **What's Not.** Wireless devices aside, with speeds measured in megabits being bandied about, it's no surprise that classic modems are on their way out. Millions of users will keep dialing up to ISPs, but it won't be worth mentioning any more than using a remote control to turn on a television set.

The only interest in modems these days is over the fact that some external ones now hook up through a Universal Serial Bus (USB) rather than the old serial port. USB allows multiple kinds of hardware devices to be connected through the same port, and most USB devices can be hot-swapped, meaning they can be connected and disconnected without turning off the computer.

If a modem can be a darling these days, it's one like the Shark Multimedia Leopard Pocket USB, an external, 56Kbps modem that claims to be the first pocket-sized USB modem. The \$79.95 device comes in five translucent colors (<http://www.sharkmm.com>).

The old competing standards for 56Kbps modems—x2 and K56flex—are out, too, replaced by the V.90 communications protocol. In fact, anything slower than 56Kbps, which was introduced in 1997, is to be pooh-poohed by anyone serious about getting an Internet fix.

Even though it's faster than 56Kbps, the news isn't much better for proponents of

Integrated Services Digital Network (ISDN), which was expected to be the answer for faster Internet access in the home a couple of years ago.

ISDN, which works over copper telephone wires, isn't generally considered to deliver as much power for the dollar as other broadband technologies. ISDN users are still encouraged to have a second phone line because the line won't work at all if the power goes out.



Electrolux's Screenfridge

According to IDC, at the end of 1999, about 240,000 residential users had ISDN. That number is expected to only rise to 500,000 by 2003 and then taper off. Harris expects that most ISDN users will merely be biding their time until other broadband service becomes available in their area, and then most of them will change over to DSL lines.

While ISDN's show may be ending, the originally scheduled programming for WebTV seems to have been interrupted.

When these set-top boxes that allow Internet access through a television set were introduced three years ago, industry sages declared them the way for consumers to get cheap and easy Internet access.

Then came the sub-\$1,000 PC and after that computers that cost even less, or nothing, when paired with an Internet access plan. As it turns out, most consumers have been willing to pay a little extra money and deal with a few hassles for all the extra capabilities a computer offers.

■ **What's Next.** By 2002 or 2003, Harris says to watch for another kind of high-speed access to start taking off—fixed wireless service. The details are still being worked out, but with this strategy, a receiver dish attached to the home receives both television and Internet data from remote antenna towers. Speeds range from 2Mbps to 10Mbps.

Right now, the service is only offered by a handful of companies, but it's definitely something to watch, especially since Sprint and MCI, shortly after merging, announced their serious interest in the technology.

But enough about PCs already. The Internet is breaking out of the PC, as all kinds of appliances and handheld devices get wired.

Last summer, Tokheim Corp. introduced plans for an Internet-ready gas pump, with a touch screen for viewing the Web. Consumers will be able to use the Windows CE-based devices for checking weather and traffic, making hotel reservations, or ordering items from a convenience store with a drive-through window.

We might not need the Internet at gas pumps, however, if vehicles themselves are Internet-ready. At least one car with Web access has been scheduled for release in 2000. Last November, General Motors announced it would begin selling cars that offer personalized, Web-based information such as headlines, sports scores, stock quotes, and e-mail, accessible through a voice prompt. Other plans in the works include the ability to upload MP3 music files to the vehicle and listen to satellite radio.

The wheeled hunk of metal in the garage won't be the only everyday item that takes to the Internet. The Ariston digital oven can go online, keeping track of recipes and temperatures or offering advice on food conservation or dishwashing.

If the refrigerator gets an inferiority complex, there's the Aristonlux's Screenfridge, now in prototype, which has a built-in PC with a modem. Using the touch screen on the fridge door and the built-in microphone and camera, family members can send each other video-mail, send and receive e-mails, surf the Web, check a database of recipes, and order groceries, plus watch television and listen to the radio. Electrolux plans to roll out more smart appliances every year.

Meanwhile, the next version of the insanely popular Nintendo Game Boy will connect to the Internet to allow network play, chat, and other functions. Officials aren't giving away many details, but the device is scheduled for release in August in Japan and by Christmas in North America and Europe.

The Game Boy's bigger, less portable competitor, the Sega Dreamcast, first added this kind of function to gaming devices when, in September of last year, it became the first video game console with a built-in 56Kbps modem (<http://www.sega.com>). With all the online gaming already taking place, there's no reason why many more gaming devices with built-in modems won't follow.

In the business sector, there's a lot of talk about wireless technology. The Internet will be accessed wirelessly not only on PDAs, but also on all kinds of smaller devices, including pagers and phones.

Sprint PCS (<http://www.sprintpcs.com>) service is leading the way with its Wireless Web Connection. Not only can a phone work in place of a modem, it also has a small screen for Web and e-mail access.

Naqi Jaffery, industry analyst at Dataquest, says that portable, Internet-ready devices are rapidly beginning to take off. Dataquest estimates that the number of subscribers to wireless data services will grow from 3 million in 1999 to 36 million in 2003.

"We are going to be seeing in the next couple of years a wide variety of devices that will be embedded with browsing capabilities to allow people to access the Internet," Jaffery says. "For even consumers it is a great tool to be able, for instance, to trade stocks or access information and basically even remain in contact with their family

and friends. . . . What has been holding the growth until now was the absence of standardized protocols."

He refers to WAP. The Wireless Access Protocol (WAP) is an open, global specification that aims to standardize the way wireless handheld devices access and interact with information. WAP-enabled devices, which run on various platforms, have limited bandwidth and do not usually have keyboards or include mobile phones, pagers, two-way radios, or PDAs. (For more information, visit the WAP forum at <http://www.wapforum.org>.)

Bryan Prohm, a senior analyst at Dataquest, says two things must happen

before wireless handheld devices really take off, though. The content must be useful for many home users, and speeds must improve. "If you can get high-speed access for the Internet in your house for a price similar to what you're going to pay to get access on the phone, the tendency might be to use the home-based Internet."

"The wireless Internet will evolve into something that is much more sensitive or location sensitive," he says. "The Internet over the phone is something you're just seeing the first baby steps of." **[S]**

by Sarah D. Scalet

Terms To Know

broadband—A form of data transmission in which several data streams are sent simultaneously over common communications lines such as telephone or cable wires. The result is fast Internet access. Broadband speeds are usually measured in megabits per second (Mbps) rather than kilobits per second (Kbps).

cable modems—This type of broadband transmission, offered by cable companies, lets users access the Internet over the same lines that bring them cable television, in a setup where some of the line is digitized and used for data instead of television signals. By some estimates, computers with cable modems receive data at between one megabit per second (Mbps) and 3Mbps and send it at between 500 kilobits per second (Kbps) and 2.5Mbps.

Digital Subscriber Line (DSL)—Various types of this broadband transmission, offered by telephone com-

panies and other providers, use digital coding to squeeze information through the common copper telephone wire system. A true DSL connection is always on, meaning there is no need to dial up to an Internet service provider. The type most common in the United States, Asymmetric DSL or ADSL, lets PCs receive data at speeds ranging from 1.5 megabits per second (Mbps) to 9Mbps and send it at between 256 kilobits per second (Kbps) and 640Kbps.

Integrated Services Digital Network (ISDN)—This form of broadband transmission, offered by telephone companies, works over common copper telephone wires. With basic ISDN, the wire is split into three channels, two of which are used to transmit data at speeds of up to 64 kilobits per second (Kbps). ISDN channels can be bonded together for speeds of up to 128Kbps.

Universal Serial Bus (USB)—This up-and-coming port is expected to replace serial and parallel ports. USB connects a wide range of peripherals, including modems, printers, scanners, keyboards, and mice. Up to 127 devices can be daisy-chained to one computer, and devices are generally hot-swappable, meaning they can be connected and disconnected without shutting down the computer.

V.90—This standard for 56 kilobits per second (Kbps) modems, released in 1998, replaces x2 and K56flex, two competing and incompatible standards for modem communications.

Wireless Application Protocol (WAP)—This open industry standard for mobile devices, which makes use of Internet standards, allows a variety of handheld devices to access and respond to data, such as that on the Internet.

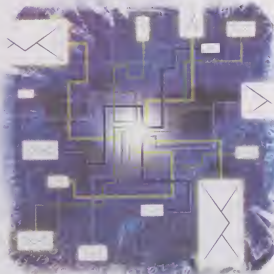
E-mail

Free Accounts Ensure It Will Soon Be Everywhere

Like many people today, John Agno, president of Signature, relies extensively on e-mail for personal and business communication. Agno lives in Ann Arbor, Michigan and communicates often with his two grandchildren in California. He finds it a good way to stay in touch. Unlike the telephone, there are no expensive long distance costs. Plus he and the kids can exchange pictures as attachments. "Being a proud grandfather, I e-mail their pictures to other people," he says.

Locally, he uses e-mail to communicate with members of his prayer breakfast group, and following a surprise birthday party, he e-mailed thank-you notes. E-mail is a vital component in Agno's work as a business coach working with clients around the country. "I spend a lot of time on the phone and using e-mail," he says. "With coaching, it's like Mitch and Morrie, in 'Tuesdays With Morrie.' The coach doesn't set the agenda; the person being coached does. When there's something in their life they need to talk to the coach about, the coach provides wisdom and clarity. E-mail is a good tool to allow clarity to come out."

Agno's target market consists of human resource directors at companies. "I use an e-mail newsletter to talk to human resource directors about topics such as how they develop leaders in their company." Acting as the hub of a network of coaches who use assessment tools in their work, he's responsible for contacting the manufacturers of these tools with questions. Of course, this too is accomplished via e-mail.



Agno, who uses the Microsoft Outlook Express e-mail program, likes to personalize messages with a font in his own handwriting from Signature Software (<http://www.signaturesoftware.com>), which is not connected to Agno's company. "You fill out a form with a handwriting sample, and they create a font," he says.

Agno carries a laptop and accesses his e-mail using an 800 phone number when he's on the road. "I don't pick up e-mail when I'm on vacation, but I'll check voice mail." He notes that in communicating today you have to be aware of whether people are voice or e-mail centered.

Agno describes e-mail communication as courteous. "It's not intrusive, like the phone," he says. "You allow the receiver to receive and then answer the message on his or her own time schedules."

Agno expects that he'll be using e-mail to pay bills and will use e-talk as well as text messages. The drawback to e-mail is what he calls the digital danger posed by viruses. "You have virtual conversations, and you trust people who send you messages," he says. "I did

that with a human resource manager from Pittsburgh. I got a virus, and now always keep my virus protection updated. I dream of a kinder, gentler world where I can send and receive e-mail without the concern of a hostile message attaching itself to any incoming messages. Hopefully our anti-viral researchers and cybernetic cops will find ways and means to protect this new communication method. But until we each get fitted for our personal computer digital immune system, expect to see more worms and viruses coming our way. Perhaps we all will become accustomed to checking each morning, along with the weather forecast, the Internet posted Virus Calendar for the Infection Specials of the Day."

Agno is like many e-mail users today. We love the convenience and low cost of e-mail, welcome the freedom to access it anywhere, find it empowers us to do things we otherwise couldn't, feel some frustration as we and others straddle both voice and e-mail modes, anticipate that e-mail will become even more important in our daily lives, and have a nagging concern about viral contamination.

It seems everyone wants to know where e-mail is headed. There are 270 million e-mail boxes in the United States or about 2.5 per user according to a study done by Messaging Online (<http://www.messagingonline.com>). The average person has an e-mail account at work, one on a Web mail service, such as Hotmail, or one on an Internet Service Provider (ISP) or online service, such as America Online. People are increasingly accessing e-mail from home. In the early

What's HOT

- Free Web-based e-mail
- Outsourced support for business e-mail
- Personalized e-mail

What's NOT

- WebTV
- POP accounts
- Lack of standards governing e-mail use

What's NEXT

- E-talk and animation
- Unified messaging
- E-mails from smart appliances

1990s, 20% of the access was from home and 80% from work. Today the split has decreased to 40/60.

Worldwide, it took eight years for the first million e-mail boxes to be opened and another 11 years to reach the 100 million achieved at the end of 1995. The number has doubled twice in the last four years to more than 435 million users at the end of September 1999. The study notes that by 2003 or 2004 there would be more Web mail accounts than people in the world if present trends were to continue.

■ What's Hot. Overwhelmingly, Web-based free e-mail or freemail is what's hot. Yahoo! Mail (<http://mail.yahoo.com>), Excite Mail (<http://mail.excite.com>), HotMail (<http://www.hotmail.com>) and MailCity (<http://www.mailcity.com>) are the most popular services in this category. In exchange for viewing a few ad messages, you get to access your e-mail from any computer with Internet access and a Web browser. To send or retrieve messages, you just go to the e-mail service's Web site, and enter your username and password. It's a welcome solution for the traveler, and it even enables people who don't own a computer to have e-mail accounts they can access at a public library or cybercafe.

Lisa Pollock, senior producer at Yahoo! Mail, says growth there has been tremendous. "There are a couple of reasons. It's simple and very convenient. People can check it from anywhere. And we're fostering international growth. A year ago, we offered e-mail mostly in English. Now we have 12 or 13 languages.

"Also, we're integrating with other services. Instead of just sending e-mail, people can access their address book, check their calendar and send a greeting card." Pollock says the service is becoming more full-featured and now supports Hypertext Markup Language (HTML), graphics with color, pictures and audio, as well as text. Users can also set up filters that will send the spam messages they receive to a "bulk mail folder."

Yahoo! Mail provides 3 megabytes (MB) of free storage space, which is sufficient for about 1,000 text messages. "If you're a small business and need to receive PowerPoint presentations, that isn't enough," says Pollock. "So now we give them the option of expanding it for a fee."

A number of niche sites also offer free e-mail. GrandparentWorld.com (<http://grandparentworld.com>) is worth noting because it capitalizes on the increasing number of older people using the Internet. "Grandparents in

Overwhelmingly, Web-based free e-mail or freemail is what's hot.

the United States are 60 million strong and growing," says Kristene George, co-founder of the Web site. "Forty percent of people over 50 have their own PC, and 70% of those use the Internet regularly. They spend 47% more time online than the average for all other age groups."

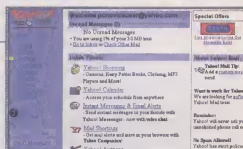
George and her father founded the site to enable grandparents to stay in touch with distant grandchildren. "We're geared toward people who are scared of computers," says George. "We make it easy to e-mail, read articles, and shop without having to go surfing." She adds that e-mail addresses are never sold, and the site's advertisers do not send e-mail promotions.

Before signing up for an e-mail service, consider features such as the amount of storage space, ability to forward mail from other e-mail accounts, or support for sending and receiving attachments. Check out the Free Email Address Directory (<http://www.emailaddresses.com>) where you'll find a list of more than 1,000 services. Some listings also carry helpful comments from users, such as "It ate my e-mail," or "Sometimes it takes forever to download messages."

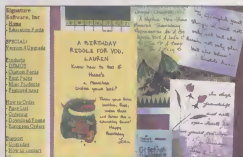
Also hot is the outsourcing of business e-mail services, says Kerry Stackpole, president/CEO of The Electronic Business Forum (formerly The Electronic Messaging Association). "Almost every e-mail application in use by big business can be adapted to the smaller enterprise," he says. "Big companies usually have an edge because they can employ large information systems departments. Small companies can now acquire virtually all of the same capacity on an outsource basis."

Companies such as Net Exchange (<http://www.netexchange.com>) handle out-sourced business e-mail. And a trend in outsourcing is netsourcing, which means out-sourced applications are Web-based. One such provider is Mi8 (<http://www.mi8.com>).

Other services aim to provide security for business e-mail communications. Examples are CertifiedMail (<http://www.certifiedmail.com>), which provides secure message delivery and



Yahoo! Mail is a free Web-based e-mail service that features three megabytes free storage, and supports HTML, graphics with color, pictures, and audio.



Personalize e-mail messages with your own handwriting font created by Signature Software.



Qualcomm's
pdQ
smartphone

tracking as well as Authentidate.com (<http://www.authentidate.com>), a Web-based document authentication service which protects e-mail, fax and paper documents such as wills, contracts, and intellectual property. At a cost of 10 cents for about two and one-half pages of text, you can e-mail or upload documents to Authentidate for time-stamping and storage.

The ability to customize your personal communications is growing. Type messages that will appear in your own handwriting, attach photos of your new baby, and even send colorful birth announcements. You can create e-mail announcements or invitations without special software using the free templates at Senada.com (<http://www.senada.com>).

■ **What's Not.** Remember WebTV (http://www.webtv.com)? Computerphobes were supposed to buy up the low-cost set-top boxes so they could sit at their friendly TV set, surf the Web and read or send e-mail without having to use a dreaded computer. The devices are easy to use and inexpensive, but haven't caught on with the mass market for several reasons. Computer prices have dropped and most consumers seem to want more functions than Web TV can offer.

The lack of generally accepted social standards governing e-mail communication isn't hot, either. How many times do you send an urgent e-mail followed by a phone call to make sure your message gets attention? Many people who give out their e-mail addresses to friends and business associates don't check their e-mail daily.

"Many e-mails aren't even opened," says Sandy Trupp, who along with Maureen Chase, is writing a book entitled "Office E-mails That Really Click," to be published by Aegis. "One information systems manager said 80% of her company's e-mails were deleted without being read." The authors advise senders to use subject headings that will get attention, such as "Read before close of business day," and developing a style and reputation for sending interesting e-mails. In terms of receiving e-mail, Chase says: "If you give out your e-mail address, that tells people you accept e-mail."

Also out is the notion of installing anti-virus protection and forgetting about it. The number of 14- to 21-year-olds who get a thrill out of starting computer viruses is growing, and the protection that worked last month may be outmoded the next. Makers of anti-virus programs, such as Symantec (http://www.symantec.com) and McAfee (http://www.mcafee.com) provide updates you can download and install when you buy their products.

■ **What's Next.** "Virtually all e-commerce applications are based on economic

messaging as a platform," says Stackpole. "That said, it will be the application of wireless technologies that will drive the day-to-day use of messaging for the mundane tasks of life, such as making appointments, lunch reservations and the like."

While most Americans do not yet own a cell phone, early adopters will jump on wireless messaging such as that found in the pdQ smartphone from Qualcomm (http://www.qualcomm.com). It's a wireless phone, and Palm organizer with Web access and e-mail capabilities all in one. Models range from about \$500 to \$1,000.

Stackpole sees the demand for high-speed Internet connection growing at an alarming rate. "Look for companies of all sorts to offer subsidized, high-speed access for consumers," he says. He adds that until speeds accelerate, people won't warm up to e-talk or animated messages. "The best perspective on these developments can be seen in the use of online greeting cards from Hallmark, American Greetings, and Blue Mountain Arts," he says. "They're fun and easy to use, but without a fast modem, cable or Digital Subscriber Line (DSL) connection, they're very slow to open."

Unified messaging, even free unified messaging, is another trend Stackpole anticipates will grow. It's a service that places all your incoming voice, e-mail and fax messages into a single database for you to retrieve via phone or PC.

For better or worse, companies will increasingly handle customer service via e-mail. "The next stage of customer service will be fully automated," says Dennis Salguero, co-author of a book on programming. "Companies will rely on customers to go to the Web site where they'll fill out a form which will be submitted to a database that sends out a pre-formatted letter." He says the form might include a "free-form section" where the customer can write in a question. "That section will go to a product manager who may or may not reply.

Terms To Know

attachment—Word processing documents, graphics, spreadsheets, and other files that are attached to an e-mail messages.

e-talk—Voice messages that are transmitted using e-mail.

Hypertext Markup Language (HTML)—Language used to create electronic documents, especially pages on the World Wide Web that contain hyperlinks, which allow users to jump from one document to another by clicking a phrase or icon.

Post Office Protocol (POP)—A format for storing and retrieving E-mail messages used by mail servers and clients. POP works with Simple Mail Transfer Protocol (SMTP), which enables e-mail messages to be sent from one system to another.

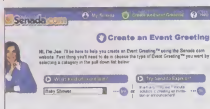
spam—Unsolicited junk e-mail.

Web-based e-mail—E-mail accounts that can be accessed from any computer or device that can connect to the Internet.

One of the upcoming trends is that a lot of companies are looking for fully automated solutions."

Finally, Stackpole offers some blue sky projections. Get ready to discover e-mail messages sent by your toilet or toaster. "We are not far away from the day when your toilet bowl will be able to monitor your bodily functions, provide feedback about weight, fat and sugar content and prescribe a recommended regimen or diet after sharing all of that information with your doctor, of course," he says. "By the way, the left hand sensor on your toaster is out, and the wash is standing by until energy rates are off-peak to save your household budget." He concludes: "We are heading into fascinating times." [E]

by Leanna Skarnulis



Create e-mail announcements or invitations using the free templates at Senda.com.



Protect e-mail, fax, and paper documents such as wills, contracts, and intellectual property using the Web-based document authentication services of Authentidate.com.

Internet Service Providers

Companies Marked By New Alliances & Free Services

There's no question that use of the Internet is exploding. According to International Data Corp. (IDC), one-third of American households have Internet access. By 2003, two-thirds will. As that number grows, so do the people who pay allegiance to an Internet service provider (ISP).

Some things haven't changed, however. Long-time players America Online (AOL), CompuServe, and Prodigy are still among the top 10 providers. Most customers pay about \$20 per month for unlimited access to the Internet, e-mail, and space to post personal Web pages. But mergers, new alliances, free services, and faster access are changing ISPs.

■ What's Hot. The flashiest change has to do with the free ISPs, which are doing to Internet access what Juno did to e-mail four years ago: providing free service to users who give up a little personal information and don't mind viewing a permanent advertising banner while using the service. Most prominent is NetZero (<http://www.netzero.com>), followed by AltaVista (<http://www.altavista.com>).

Emily Meehan, analyst at the Yankee Group, says it remains to be seen whether these services last. "Clearly NetZero has done a great job, but its user base is not primarily an active one," she says. "Right now we're in an experimentation

stage." People are downloading the software to evaluate it or to use it only when they have problems with their primary ISP.

Even if free ISPs don't last, Meehan says they will have left their mark. "The free Internet service provider is revolutionizing the way Internet access is marketed to consumers," she says. Free ISPs put pressure on traditional ones to keep down prices and to think of more innovative ways to find and keep customers—not only through good, reliable service.

One result is a growing number of partnerships in which ISPs sell access to mainstream consumer brands, such as banks, retailers, or PC manufacturers. These companies bundle

Internet access with their products. JB Oxford & Co. (<http://www.jboxford.com>), for instance, offers free access to customers who keep a balance of \$2,000.

"It makes sense for mainstream brands to subsidize Internet access to desirable customers," Meehan says.

These are not the only partnerships being formed. Anyone who pays attention to ISP news will see agreements regularly announced between various ISPs and content and technology providers. The mergers themselves are changing, says Steven Harris, research analyst at IDC.

"Most of the ISPs in the past have tended to purchase small regional ISP players, but now we're starting to see some big ones," he says.

No. 1 AOL acquired No. 2 CompuServe, and then AOL acquired Time Warner. Gateway.net (<http://www.gateway.net>), EarthLink (<http://www.earthlink.com>), and MindSpring (<http://www.mindspring.com>) announced a merger that will make them the second largest ISP in the country, above rivals MSN (<http://www.msn.com>) and AT&T WorldNet (<http://www.att.net>). EarthLink joined hands with Sprint (<http://www.sprint.com>) and Prodigy with SBC Communications (<http://www.sbc.com/Prodigy/Home.html>).

"Lots of large telecom carriers are giving up consumer dial-up subscriptions to ISPs," Harris says. "The big carriers tend to look more at the business market, where they can make a lot more money than \$19.95 per month."

Another trend has been giving consumers generous rebates on PCs in exchange for an extended service contract. CompuServe (<http://www.compuserve.com>), for instance, offered a \$400 rebate to anyone who purchased an eligible computer and signed up for a three-year, \$21.95 per month, unlimited access plan. Consumers who committed snatched up decent machines for about \$300 or less.



What's HOT

- Free Internet access
- Mergers
- AOL

What's NOT

- Hourly access plans
- Online services
- ISPs without broadband service

What's NEXT

- Virtual ISPs
- Affinity ISPs
- Web hosting services

At least one thing in Internet access hasn't really changed: the dominance of AOL. Known for its beginner-friendly interface, AOL (<http://www.aol.com>) gets a bad rap from seasoned Internet users, but it still towers above the others.

According to IDC, the total number of subscribers at competitors Nos. 2 through 20 still doesn't meet AOL's subscriber base. Not counting those in Europe, South America, Asia, and Australia, AOL had 15.6 million subscribers in mid-1999, plus 1 million CompuServe subscribers. That leaves the online behemoth with 41.4% of the U.S. market, while No. 2 EarthLink and MindSpring together take about 6.6%.

AOL keeps growing; Harris says it has been gaining about a million subscribers each quarter. He attributes the company's success to effective marketing, acquisitions, and a reputation for being easy to use. "I think everyone just kind of knows the name, so if people are just getting Internet access right now ... they're probably going to go with AOL."

■ **What's Not.** As monthly and free accounts proliferate, hourly access is quietly disappearing. Some ISPs still offer plans in which customers pay a lower fee for set hours each month, then pay for each additional hour online. But these plans are offered quietly, buried on Web pages as alternatives. Internet-hungry consumers don't want to worry about each minute online; they want to pay a set fee each month.

The term "online services" also seems to be fading from the online consciousness. There used to be a clear distinction between online services, which provided members-only content and access to the Internet, and ISPs, which provided access only to the Internet, usually for less money. AOL itself, once the ultimate online service, is now considered more an ISP-plus, with some members-only areas but a focus mostly on the Internet. Users can access AOL from the Internet, and the Internet from AOL.

With so much growth, it may be that the only ISPs left out are those not offering, or at least making plans for faster, broadband access. Most common are cable modems, which use the same lines that bring television to households, and Digital Subscriber Lines (DSL), which work over standard copper phone lines but let subscribers talk on the phone while online.

According to IDC, DSL had 330,000 residential subscribers at the end of 1999, and 1.35 million households were using cable modems. By 2003, those numbers were expected to skyrocket to 9.3 million and 9 million, respectively.

ISPs are lining up to be service providers in this rapidly expanding market. Most major ISPs prominently mention broadband plans on their sites, if not offers for the service itself. Other ISPs will be left in the dust, as they lose customers who upgrade or potential customers who have an eye toward upgrading.

■ **What's Next.** Along the way, Meehan envisions that ISPs will reevaluate their target market and evolve into something more akin to the "Intel inside" sticker, which marks the microprocessor behind the scenes in most PCs today, than standalone service.

"Now they'll start to go after businesses who want to bundle Internet access in their product offering," Meehan says, like the JB Oxford free Internet deal. "Anything that creates a passion or interest with consumers is a great way to bundle access."

The result will be an increasing number of virtual ISPs, well-known brand companies who will work with ISPs to offer Internet access to existing customers. The virtual ISP will use its name to promote the service, and a wholesale ISP will take care of the details as far as servers, dial-up numbers, technical support, and other details.

Not only will these virtual ISPs offer deals to loyal customers, they'll be a way for Internet users to support a company or cause or to acquire a certain e-mail address with a type of virtual ISP known as an affinity ISP. Harris says an affinity ISP might charge, say, \$20 per month for Internet access and pay \$13 to the wholesale ISP. The company promotes the Internet access using its name and pockets the profit.

Baltimore Ravens fans already have such an option: Ravenszone.net (<http://www.ravenszone.net>), through which they can sign up for monthly Internet service that includes access to members-only information about the team. The \$19.95 per month fee (after a \$24.95 setup) includes unlimited dial-up access to the Internet, and a user's e-mail address becomes Username@ravenszone.net, the electronic equivalent of a vanity license plate.

At the same time, more ISPs are getting into the Web hosting business and pushing packages that are becoming appealing to less serious would-be Webmasters. AT&T has been advertising Web hosting packages starting at \$25 per month, for a limited time with the initial setup fee waived (<http://www.ip-services.att.com>). The package includes usage reports, common gateway interface (CGI) scripting, domain name service, and e-mail.

Terms To Know

affinity Internet service provider (ISP)—A virtual ISP that lets Internet users support a company or cause by purchasing Internet access. A user's e-mail address reflects his or her affinity with the group.

broadband—A form of data transmission in which several data streams are sent simultaneously over communications lines, such as telephone or cable wires.

cable modems—A type of broadband transmission offered by cable companies that lets users access the Internet over the lines that bring them cable television.

Digital Subscriber Line (DSL)—Various types of this broadband transmission, offered by telephone companies and other providers, use digital coding to squeeze information through the common copper telephone wire system.

domain name registration—The process of buying rights to a unique Web address, such as <http://www.yourname.com>.

online service—A company that provides Internet access plus other services, such as members-only content.

virtual Internet service provider (ISP)—A company that sells Internet access provided by another vendor. A wholesale ISP provides the behind-the-scenes service, while the virtual ISP promotes and sells it.

Web hosting—A service, often provided by Internet service providers, that allows homes or businesses to have a Web site without maintaining a Web server.

Because ISPs spend \$200 or more to get one subscriber, Harris points out, "It's cheaper to get additional revenue from existing customers than to try to get new customers." Most ISPs get 90% or more of their revenue from subscriber fees and would like to get more revenue from advertising and other deals. "The biggest interest from them [ISPs] is trying to move away from their reliance on subscriber fees." [E]

by Sarah D. Scalet

Internet Chat

Video & Voice Technologies To Improve This Interactive Tool

Internet chat is ultra hot right now. Once thought to be the place populated by teenyboppers and frustrated geeks, chat is now a place where everyday people exchange ideas, offer support, hang out, attend celebrity events, and even conduct business.

People chat is in real-time, which means everyone is participating at their computers and interacting with each other (as opposed to posting on message boards such as Usenet newsgroups or conferencing systems). Real-time chat was one of the first applications on the Internet, long before anyone thought about the Web, and it's likely to remain one of the most popular Internet tools.

■ What's Hot. Internet Relay Chat (IRC), one of the first major chat applications on the Internet, proves that everything old is new again. IRC used to rely on arcane commands given in a totally text-based window. Now, most people use a graphical IRC interface programs such as mIRC (<http://www.mirc.com>) for Windows and IRCle (<http://www.ircl.com>) for Macs. These programs make connecting to IRC servers much easier, and there is an abundance of information on both sites about finding an IRC network and joining a chat "channel."

One of the hottest trends right now is using chat to build community. "Chat is maturing, coming into its own as a community in its own right," says John Wampler, senior producer for business-to-business

services for Talk City (<http://www.talkcity.com>). People use chat rooms for everything, including help for moms with kids at home; support for those with serious illnesses; and to chat about movies, books, and television. "We want to provide a good space for communities to grow," Wampler says.

Talk City is an example in itself of a big trend in chat: the move from online services such as America Online (AOL) to the Web. AOL used to have the market in graphical interface chat. With new technologies such as Java, however, sites such as Talk City can offer chat on the Web. Along with discussions on different themes in dozens of rooms, Talk City offers celebrity events, which Wampler says are popular. Recently, John

McCain chatted with participants, as did Al Gore on another occasion.

A huge trend in chat is instant-message (IM) programs. IMs let you talk with other users as long as you and the other users have the same IM software and are connected to the Internet. Why is IMing so popular? It's part of the drive toward interactivity; a less solitary Web experience is what users want.

The leading IM program on the Internet is ICQ (<http://www.icq.com>). According to Elliot Noss, president and CEO of Tucows (<http://www.tucows.com>), the popular software download site, most of the IM downloads are for ICQ. "ICQ dominates, and nothing else comes close. Other programs, like America Online Instant Messenger (AIM), are a distant second. They're not in the same game. Part of the reason is the use of advertisements [on AIM]."

■ What's Not. For most of the 1990s, Internet users associated chat almost exclusively with AOL, and the association wasn't always a

favorable one. Web users often considered chat inane and simplistic. (This was also the stereotype of the typical AOL user.) In reality, AOL's wide variety of chat rooms includes rooms that are insipid, wickedly funny, and quite intellectual. Nevertheless, the image of AOL as a place for silly chatters has stuck.

Now AOL is no longer the main place to go for chat. Aside from IRC, chat is all over the Web. Some sites specialize in it; others have chat rooms for discussion of specific subjects. Sites such as the GO Network (<http://www.go.com>), Women.com (<http://www.women.com>), iVillage.com (<http://www.ivillage.com>), and PlanetRx.com (<http://www.planetrx.com>) have chats planned each week, and they use trained moderators to host their chats.



What's HOT

- Internet Relay Chat (IRC)
- Using chat to build community
- Web chat sites
- Instant messaging (IM) programs

What's NOT

- Associating chat with America Online
- Dirty tricks, trolls, fluffers, nukes, etc.
- Pop-up advertisements
- Too many photos, fonts, and colors

What's NEXT

- Voice chat for small groups
- Video mixed with chat
- Shopping combined with chat
- IM programs will continue to dominate

Hosted chats are a trend that Wampler recognizes as part of an overall effort to provide users with a "clean, well-lighted atmosphere." Chat has a history of having a dark side, littered with

- **trollers:** those looking for trouble
- **dirty tricks:** users trying to get passwords from other chatters
- **flooders/scrollers:** people who fill the screen with garbage, making it impossible to chat
- **nukers:** people who know how to shut down a chat room or who kick people out when unauthorized to do so
- **room wars and invasions:** turf battles

As chat has matured, it's begun to disenfranchise those who disrupt in favor of building community with those who want to connect with others.

Other chat crazes include the ability to upload a picture into a chat room and to change the fonts and colors of text. A little of this goes a long way. Just as in the early days of desktop publishing when folks finally tired of using every font imaginable just because they could, people are beginning to use these capabilities as a spice instead of a main course.

■ What's Next. The next big adventure is probably going to be chats that use voice and pictures. Internet telephony (see the "Terms To Know" sidebar) has already been used for voice phone calls between two people, but some see it as the next addition to chat. The upside for voice chat is that people who don't have good typing skills will be able to take part. Wampler, however, sees a limited application for voice chat—and that is for small groups of perhaps three or four. "Just like a conference call with too many people on it, a chat with more than a few

Terms To Know

chat—Live communication over the Internet. E-mail or message boards with each person sending mail or making a post and then waiting for a reply, chatting involves two or more people typing comments in a conversational style. As one person enters text, it appears on the other person's screen in real-time. You can find chat rooms on commercial online services such as America Online, on Web sites such as Talk City, and by using Internet Relay Chat software and an Internet connection.

instant messaging—This involves sending a message over the Internet to another user that immediately appears on that user's computer screen. Instant messages are different from e-mail messages in that they do not sit unread until the

user checks his or her e-mail; they appear on-screen as they are received. Instant messaging does, however, require software on both the sender's and recipient's computers. Examples of instant messaging software are ICQ and America Online Instant Messenger (AIM). Instant messaging is handy for urgent communication or for just chitchatting with friends.

Internet Relay Chat (IRC)—A system that allows real-time text chatting between multiple participants around the world over the Internet. Users log on to any one of many concurrently operative IRC channels dedicated to a variety of topics and talk to one another by typing. Typically, a sentence or two is communicated at one time, and users read each other's comments as they scroll by on-screen. Joining

IRC discussions requires a connection to the Internet and IRC software. The IRC software sends and receives messages from whatever IRC server is hosting a particular discussion. There are many IRC-server computers.

telephony—A technology that lets users use a PC to make and receive telephone calls. Telephony software often includes features such as voice mail, auto dialing, and on-screen messaging. Sounds are converted into electrical signals as they are transmitted to another location where they are converted back to sound. Telephony includes communications such as teleconferencing and facsimile (fax). Telephony also lets you have a universal inbox, where e-mail, fax, and voice-mail messages are all accessible from your computer.

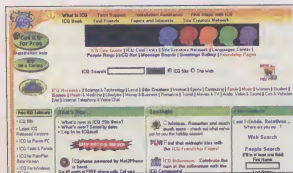
people would quickly become confusing." One application, though, may be for speaker events, where the guest speaker's voice comments could be broadcasted, while folks in the audience chatted about it. "Voice chat will not supercede text chat," Wampler says, "but it can be an effective way to break the keyboard barrier."

Another addition on the horizon is using video in chat. Businesses are anticipating this with particular eagerness because this will help them use chat more effectively for training and corporate communications. Video capabilities in chat will also please everyday users. Being able to gather your friends and family together and make them sit through your videos from your Disney World trip will give a new twist to an old tradition.

Shopping while chatting with others is also coming. E-commerce is already huge, and retailers are looking for more ways to engage people in their online shopping. In the future, we will see shoppers gathered together to chat while a moderator demonstrates a product. This home shopping television-style experience lets shoppers feel like they are shopping with others.

You can expect IM programs to continue to be big news on the chat front, but with far more features than they have now. Now that AOL owns ICQ, it remains to be seen if AOL will support two products: ICQ and AIM. Watch for a possible merger between the two products in which AOL drops one but keeps the functionality of the other. **ES**

by Steve A. Glaser and Elizabeth Lewis



ICQ is the predominant instant messaging (IM) program. The ICQ Web site offers a wealth of information for ICQ users.

Mailing Lists & Electronic Newsletters

Maximize Communications Without Losing Time

When Chris Pirillo started his e-mail newsletter, a guide to PC shareware called "Lockergnome," three years ago, he had no idea that his hobbyist's labor of love would blossom into one of the Web's most popular newsletters, which today hits the inboxes of about 180,000 Netizens, and which now supports Pirillo through its ad sales.

Pirillo credits his success in part to the inherent advantages that e-mail newsletters provide, advantages which many businesses are beginning to recognize. As never before, companies are scrambling to add newsletters to their Web sites in an effort to attract and retain more customers.

"E-mail publishing is the killer medium for communicating on the Internet," says Pirillo, author of "Poor Richard's Guide to E-mail Publishing." "A lot more companies are going to start to embrace e-mail as one of the pillars of their Internet presence. If they don't, their house will fall."

Pirillo points out that e-mail usage is nearly universal among Internet users, who also commonly create long lists of bookmarks to sites



they never visit again. Companies that effectively use e-mail newsletters can "establish a relationship with the user," he says, and thereby ensure in a way no other method can that users will return to the site.

Studies have shown that newsletters delivered on request to targeted groups of customers can be up to 30 times more effective than banner ads in promoting products, says John Buckman, CEO of Lyris, a company that

provides e-mail list and newsletter management software.

Like everything else on the Internet, e-mail newsletters and mailing lists have evolved significantly over the past few years and continue to do so.

■ **What's Hot.** "The big issue in newsletters today is HTML mail versus text," says Shannon Kinnard, author of "Marketing With Email," and an e-mail marketing consultant.

When an e-newsletter is sent to subscribers in HTML format, the recipient receives something that looks like a magazine or a Web page, complete with formatted text in varying fonts and colors, plus pictures or other graphics to accompany the articles.

Not all e-mail services can handle HTML-formatted mail, however. For instance, America Online, the nation's largest Internet provider, will not display mail in anything other than text format. If a newsletter publisher sends HTML-formatted mail to an AOL subscriber, the recipient will see garbled coding with none of the attractive effects the publisher had hoped to present.

Many companies have tried to work around this problem by producing newsletters in both HTML and text-only formats, then asking subscribers when they sign up for the newsletter which format they prefer. Another solution is to consider foregoing HTML, which not all companies need.

"What it boils down to, as with any other marketing tactic, is what are you trying to accomplish?" Kinnard says. For a consumer-oriented Web site selling products that can be pictured, an HTML newsletter makes sense, so that customers can see what is being described. But for a company that has an abstract product, such as scientific research, a

What's HOT

- E-mailing newsletters in HTML
- Customized newsletters
- Click-throughs tracking
- Easy e-newsletter signups

What's NOT

- Unsolicited e-newsletters and spam
- "Rich text" formatted e-newsletters
- E-newsletters that arrive as attachments
- Long e-newsletters

What's NEXT

- Newsletters laden with video and audio
- Increased customization of content and ads
- Automated customer service e-mail systems

text newsletter may work perfectly well.

Pirillo agrees. Too often, he says, the possibilities of technology, rather than the reality of what their readers truly need carry newsletter producers away. "I've seen people send HTML mail with 100K attachments—with background pictures of their dogs!" HTML mail can also be more difficult for viewers outside the United States, who are more likely to have slower Internet connections and older computers.

"I think HTML mostly serves the advertisers, not the readers; my goal is to serve readers first, advertisers second," says Randy Cassingham, author of "This is True," (<http://www.thisistrue.com>), a successful e-newsletter that recounts weird-but-true news stories. "One of the reasons [This is True] is popular in 176 countries is that I don't require special software to read it, and by sending plain text it's less than 10 kilobytes (KB) long."

Buckman believes that text mail is here to stay, due to too many technical problems with HTML delivery. Not only does AOL not provide it, but also customers use a variety of e-mail programs, such as Outlook Express, Netscape, Eudora Pro and others, and all have different ways of handling HTML commands.

"What we see today with HTML mail are partial implementations that work so-so, which is often worse than nothing," says Buckman. "I'm afraid I'm a curmudgeon when it comes to the future of e-mail standards: I think plain text will be with us for quite a while longer."

Besides the introduction of HTML formatting, what many companies are doing to improve their e-newsletters is customizing and personalizing them to provide content that the customer is more likely to actually open and read.

For instance, visitors to Barnes and Noble's "bn.com Insider" page (http://shop.barnesandnoble.com/vframes/enounce_send.asp?usrid=57H6EKVFKD&ref=er) can sign up for more than 70 different free newsletters, based on their reading preferences. Similarly, customers at eToys.com can choose to receive newsletters based upon the ages of their children.

BabyCenter

FREE NEWSLETTERS! Sign up to receive our weekly email newsletters and occasional CD-ROMs written especially for your stage of pregnancy or your baby's age. Also get updates from our experts on new site features, breaking news, product recalls, as well as new products and services at the BabyCenter Store. Sign up below or follow us on the Web.

E-mail address: _____

Your Baby's Due Date or Birth Date (Month Day Year) _____

☐ Send me my Baby This Week! I want to receive our weekly newsletter and occasional CD-ROMs written especially for your stage of pregnancy or your baby's age. Also get updates from our experts on new site features, breaking news, product recalls, as well as new products and services at the BabyCenter Store. Sign up below or follow us on the Web.

Your Baby's Due Date or Birth Date (Month Day Year) _____

☐ Send me my Baby This Week! I want to receive our weekly newsletter and occasional CD-ROMs written especially for your stage of pregnancy or your baby's age. Also get updates from our experts on new site features, breaking news, product recalls, as well as new products and services at the BabyCenter Store. Sign up below or follow us on the Web.

Babycenter.com provides free e-mail newsletters that are customized to reflect the subscriber's baby's age or due date.

problems and give support to one another. Another example is Random House (<http://www.randomhouse.com>), which sponsors discussion lists built around key authors, artists and emerging writers.

Because everybody who has subscribed to a discussion list sees the same messages and replies, it is like participating in an extended conversation, which creates a sense of community. Companies that sponsor discussion lists can monitor the conversations or let the e-mail go through uncensored. Company representatives can join in the discussion, answering questions and posting messages that further increase a recipient's awareness of and connection to the company.

Besides HTML mail and customization, another trend in e-newsletters today, says Buckman, is that companies are making it easier for people to sign up. Some companies still bury links to their e-newsletters. Barnes & Noble's "bn.com Insider," for instance, is very difficult to find on the company's home page and is not even described on the home page as a newsletter. However, more and more companies are including easy-to-spot links that say things like, "Sign up now for our exclusive free newsletter by mail," with a box on the home page that lets subscribers type in their e-mail addresses.

Some newsletters even go so far as to personalize the e-mail that accompanies each issue rather than "Dear Subscriber" or, as is more common, no greeting at all. Another way to increase a customer's personal feeling of connection to a company or site is through discussion lists, which are e-mail messages that go out to multiple recipients at once. For example, the "Moms Online" Web site (<http://www.momsonline.com>) provides a link to a discussion list, called "Weight-A-Minute," in which members can share their weight-loss

"People are understanding that the best way to promote repeat visits to their Web sites are to ask users to sign up for their newsletters and putting sign-up forms right on the home page," says Buckman. "Many Web sites still bury the sign-up page somewhere on their Web site, but many sites are getting a clue."

Buckman also notes that, "auditing the success of the mail delivery and of the responses is becoming increasingly important." Companies are analyzing the number of clicks that their newsletters receive back to the main Web site or to product sites that are mentioned. This can be accomplished by assigning universal resource locators (URLs) in the e-mail message that are tracked back to the original message. Studies have shown, Buckman says, that URLs mentioned in e-newsletters have a 5% to 15% click-through

bn.com

Home Search Sign Up

Choose a newsletter below, or use the buttons on the left to change categories

Check the boxes and click Submit when you are done

☐ All e-Newsletters ☐ Baby

☐ Antiques & Collectibles ☐ Books & Literature

☐ Arts ☐ Business

☐ Art, Architecture & Crafts ☐ Children

☐ Automobiles ☐ Dining & Entertaining

☐ Automobiles ☐ Education

☐ Automobiles ☐ Entertainment

☐ Automobiles ☐ Health & Fitness

☐ Automobiles ☐ Home & Garden

☐ Automobiles ☐ Music

☐ Automobiles ☐ News & Current Events

☐ Automobiles ☐ Pets

☐ Automobiles ☐ Sports & Recreation

☐ Automobiles ☐ Travel

☐ Automobiles ☐ Unclassified

Barnes & Noble's bn.com INSIDER service lets customers pick from more than 70 newsletters, depending on their literary interests.

StarOffice office productivity software

Download FREE

12.10.1999 GameReport

On the second screen of the "GameReport" document, you can see the text: "The game was a success...". The text is displayed in a large, bold font. The background of the document is a dark, textured surface. The text is white, making it stand out. The overall appearance is professional and polished.

Sun

Download FREE

Chris Pirillo's Lockergnome free, ad-supported newsletter (<http://www.lockergnome.com>) comes in HTML format and is issued on a daily and weekly digest basis.

rate, which is 10 to 30 times higher than what can be achieved with the typical banner ad.

Kinnard says that, as a reader, she finds the practice of having to click back to a Web site to get information frustrating.

"I think that asking readers to click back to the site is selfish," she says. "I'm not saying it's a bad thing or it won't work, but if you're a marketer and you're doing it, you're doing it to track activity. People read the first paragraph, for example, then click on a link for the rest and that tells the marketer: 'Hey, 80% of my readers are interested in widget cleaning!'" But it annoys readers.

"Also, if readers do as I do with my laptop, they download e-mail, unplug from the phone outlet, and head to the front porch to work off-line. I read my e-mail off-line much of the time, and I can't click through to read HTML or 'click here to finish the article' newsletters."

However, there is another reason for an e-newsletter publisher to require click throughs; most people don't like to receive lengthy e-newsletters, so the solution many companies have found is to give short versions of articles in their newsletters and put the full versions on their Web sites. Companies are increasingly using outside services, such as eGroups, Topica, and others, to automate mailing lists, so that subscribing, unsubscribing, and other customer-service issues are handled more easily.

■ What's Not. Newsletters have changed in the past few years, as Internet marketers have learned what works and what doesn't. For one thing, few newsletter publishers today would risk subscribers' wrath by subscribing customers without prior consent. Yet this is just what one of Kinnard's clients did several years ago. The client, a now-defunct lingerie retailer, used its customer base to create a subscriber list for its newsletter, which was a somewhat racy missive devoted to sex and relationships in addition to undergarments. Its unsolicited entry into e-mailboxes, especially employer-based e-mail boxes, embarrassed and angered many of the newsletter recipients. "I never had to type so many apologies in my life!" Kinnard says.

Newsletter producers also have learned that most people hate spam with a vengeance and need to be reassured that their names will not be sold to spammers for use on mailing lists.

Almost every newsletter site today includes a guarantee that this will not be done.

The formatting of newsletters has changed, too. At one time, says Buckman, there was a trend toward sending e-newsletters as rich-text formatted documents, but this declined as HTML formatting achieved the same result more effectively. Occasionally, newsletter publishers tried sending e-newsletters as Word or PDF attachments, but this also is out of favor, since attachments can take more memory and be more difficult for various e-mail programs to handle than a simple e-mail.

■ What's Next. The future of e-mail newsletters lies in even further and more refined customization, with the product delivered in such a way that customers won't see it as junk mail.

"The bigger trend [that's coming] is using e-mail to notify users of any important event," says Buckman. Companies who have surveyed and tracked their e-newsletter and e-mailing list subscribers can learn what particular customers are interested in; when the occasion arises, they can e-mail them about it.

"[It might be] an upcoming home delivery, an airplane ticket you reserved that perhaps was overlooked, a reminder service which tells you what groceries you're probably

Terms To Know

click-through—When a person clicks on a hyperlink in another medium. For example clicking an e-newsletter hyperlink may take you directly to the Web site being discussed.

discussion lists—E-mail messages and replies sent to a group of people.

e-newsletters—Electronic newsletters that are delivered via e-mail rather than printed on paper and mailed.

Hypertext Markup Language (HTML)—The coding used on the Internet to create Web pages, which can also be used to format any electronic document.

spam—Unsolicited junk e-mail.

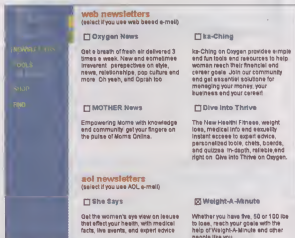
customized news mailings can be sent; for example, giving them pertinent information about flights to cities they like to visit.

Companies will know about their customers' needs through surveys, which will occur more often. The trick will be to design surveys in ways that don't turn people off.

"To subscribe [to Lockergnome], I ask people to answer two questions," Pirillo says. "If I ask them 15 questions, I'll get nowhere near the number of subscribers." In order to get more detailed results, he sets up contests with prizes that people can only enter to win by completing longer surveys.

Pirillo also predicts that future e-newsletters may come with audio and video components, though this will be many years into the future because it depends on a large percentage of Internet users worldwide having access to high-speed modems. Ultimately the future of e-mail newsletters relies less on technology than it does on simple content. As the number of e-newsletters grows, the ones that will succeed are those that offer information that people want to read and that they will find useful. **[E]**

by Lorna Collier



Moms Online (<http://www.momsonline.com>) provides links to a variety of HTML and plain-text newsletters and discussion lists.

needing; in other words, all the things that currently require person-to-person telephone calls, but rarely happen due to the cost of person to person telephone calls," Buckman says.

Kinnard points out that Delta Airlines is already using Socketware, an Atlanta-based maker of a product called Accusoft, to help define Web site visitors to such a degree that

Electronic Calendars & Planners

Look For Ones That Keep You Connected, Synchronized & On Schedule

When you open a computer magazine such as this one, you naturally expect to read about brand new technologies and products, such as e-commerce, wireless handheld devices, or software that hasn't even had time to collect dust on the shelves at Best Buy. You don't expect to read an article about things that have been in existence since ancient times. That's why we thought you might be a little surprised to see this article about calendars—one of the oldest systems known to man. Then again, humans have always been interested in tracking the progress of time and organizing our daily events according to some sort of date-related schedule.

Calendars have assumed countless different forms throughout the centuries—from stone carvings to Stonehenge, from papyrus to paper—and each has served its purpose well. But, we can assure you that the evolution of the calendar is far from complete. The scholars of centuries past would roll over in their tombs if they could only see the way in which their dating system so beautifully integrates itself into the electronic form necessitated by the Information Age of today.

Electronic calendars, particularly Web calendars, now harness the communicative power of the Internet to manage the chronological

events of our daily lives. They have taken a static object, such as the calendar hanging in your kitchen, and transformed it into a dynamically useful platform.

■ **What's Hot.** To stay on schedule at all times throughout our frantic day-to-day lives requires a lot of effort, and there are numerous calendar characteristics that help us combat this never-ending whirlwind of activities.

Web-based electronic calendars and planners. We found that Web-based calendars are hotter than software-based calendars right now. That's because the connective

nature of the Internet enables them to incorporate more of the popular, networking type of features—features that are generally found in only the largest calendar software packages, such as Microsoft Outlook. Most computers now come loaded with Microsoft Outlook, and you might be able to use some of its connecting features, such as group scheduling, while you are at work. But when you find yourself needing a calendar to encompass all the events of your daily life, you may prefer the simplicity of a Web-based calendar, especially one that can synchronize with Outlook and other similar programs.

Part of the beauty of Web-based calendars lies in their accessibility. "Whether at home, at work, or on the road, a Web-based calendar may be accessed anywhere you find a computer and an Internet connection," explains Jim McManus, director of communications at AnyDay.com.

AnyDay.com is a Web-based calendar that's been in existence since the end of July 1999. Simply direct your browser to <http://www.anyday.com> and sign up for your free online calendar and day planner. Then visit the site as often as you want to update your calendar and take advantage of AnyDay.com's additional day planning features.

Synchronization among platforms. No one stays in the same place all the time. We all live life at home, at work, online, and offline, and in each of these settings, we need to easily access the data in our electronic calendars and planners. That's why synchronization ranks as one of the hottest features in the calendar market. If the data isn't transportable to different platforms, what good does it do you? The last thing you want to do is spend hours entering all your contacts into a planner at work, only to re-enter them into your planner at home, too.

Paul Mancini is the Director of Marketing for eCal, a company that provides the underlying



What's HOT

- Synchronization among platforms
- Group scheduling
- Integrated event directories
- Sharing and publishing information

What's NOT

- Static or disconnected calendars
- Gimmicky calendars that omit the essential planning functions
- Calendars that don't adapt to your needs

What's NEXT

- Calendars acting as personal destinations
- Increased integration of components
- Integrating calendars better with wireless devices for on-the-go users

technology for the calendars and planners on big Web sites such as CBS SportsLine.com (<http://www.cbssportsline.com>), LookSmart.com (<http://www.looksmart.com>), and Yahoo! (<http://www.yahoo.com>). By doing so, eCal uses what they call the "back-end" strategy and places their calendars where people typically go on the Internet, rather than making people go to a specific and perhaps out-of-the-way portal.

What's more, eCal's calendars totally integrate themselves into the site on which they're placed so that they don't even look like eCal products. For instance, the eCal calendar at CBS SportsLine.com looks like a CBS SportsLine calendar. But, should you tire of visiting CBS SportsLine, you could open an eCal calendar on another site that offers them and access your previous information, neatly framed in a calendar with a new face.

"People are fickle on the Internet—they'll go to any site," Mancini says. "That's why eCal found it important to locate their technology on a number of different Web sites."

First on Mancini's list of hot calendar features is the ability to synchronize calendar, planner, contact manager, and address information with other personal information managers (PIMs) such as Microsoft Outlook, or with handheld devices such as Palm Pilots. "You should be able to store that information in a central area within your calendar and then easily synchronize it so you can use it no matter when or where you are," he says.

Mancini and eCal aren't the only ones who advocate synchronization. McManus assures us that AnyDay.com is also created to synchronize with other popular desktop applications and handheld devices. You can download AnyDay.com's free synchronization software, load it onto your PC, and then either set up a schedule for auto synchronization or synchronize everything manually.

Group scheduling. Gone are the days when you have to individually call or e-mail each person in your office to schedule a date and time for the annual Christmas party or the monthly meeting. At that time, you had to remember who had and hadn't responded to your inquiry and what the responses were. Group scheduling or group calendaring, one of today's hottest features, eliminates much of the hassle that accompanies the task of assembling a group of people.

According to McManus, AnyDay.com smoothly integrates your e-mail with your contacts list and your calendar.

When you want to plan an event, simply select all the individuals you want to involve from your contacts list, then prepare an e-mail message with details such as when and where and any questions you may have for group members. After sending the message to everyone, AnyDay.com tracks who has and hasn't responded and what the responses were.

Mancini says that eCal facilitates group scheduling in much the same way. You can even attach files to the messages sent to group members or integrate eCal's task list into the message if there are things on it that need to be accomplished by group members.

Integrated event directories. People typically find the public events they want to attend and place them on their calendar. But what if your calendar could save you a step by finding some of your events for you? It would be handy, wouldn't it? That's why event directories have become a hot calendar/planner feature. Read on to find out how they work.

In each of their calendars, eCal includes a public events directory for users. Open the directory to find subdirectories for sports, cultural events, television listings, weather, health and fitness, and more. Suppose, for example, you're interested in sports. You could open the sports directory, choose a particular sports team, and tell eCal to include each of that team's games throughout the pages of your electronic calendar. This process automatically places reminders about the games on the appropriate calendar day.

Plus, along with the reminder is a hyperlink you can click to open a page containing additional detailed information about the game, as well as hyperlinks to other Web sites where you can purchase team paraphernalia. Simply

put, this hot feature not only provides users with valuable event information, it also represents a new trend in the electronic calendar industry: calendar-driven e-commerce. In other words, you find an event of interest and before you know, it you're at another site from which you can purchase related products.

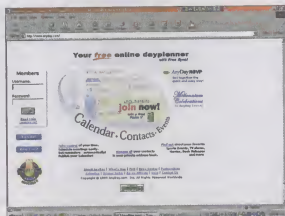
Sharing and publishing information. It's not exactly effortless to share your kitchen wall calendar or your personal calendar/planner notebook with all the members of your softball team. Such sharing would, at the very least, require a trip to Kinkos for photocopies (and perhaps a trip to the Post Office). Today's electronic calendars require no such effort, thanks to advanced information-sharing features.

AnyDay.com makes it easy to share such events as the season game schedule with your fellow city league softball team members. McManus explains that when you add the game dates into your AnyDay.com calendar, you simply specify that you want them placed in your softball calendar. (AnyDay.com users can maintain multiple calendars with minimal effort and satisfy the many different facets of their lives, such as business, personal, and even softball.) You can then share your softball calendar with your team members, and it will contain only softball-related information, not your personal appointments.

Publishing is another way of sharing your calendar with others, McManus says. If there are certain events or appointments on your calendar that you need others to see, all you have to do is select the events and choose to publish them. This creates a new AnyDay.com calendar containing only the selected events. You can send an e-mail message with the attached calendar to other people, and they can click a hyperlink in the message that opens the AnyDay.com calendar, even if they're not site members.

Personalized images. You wouldn't hang a calendar with wildflower pictures on your kitchen wall if you disliked botany and preferred marine life. The choice is obvious: You'd buy a calendar filled with whales, dolphins, and seals. Personalization is equally important in the world of electronic calendars.

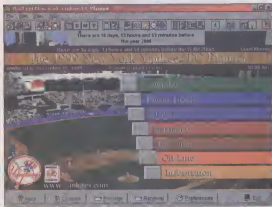
The PC Planner from Visual Horizons (generic version is downloadable free of charge from <http://www.visualhorizons.com> or personalized versions are downloadable for about \$10 from <http://www.pcplanner.com>) doesn't offer many of the hot integrated connectivity features, but it



When you visit AnyDay.com, you can sign up for a free calendar that offers such daily planning features as group scheduling, an events listing, and information sharing.

does epitomize personalization and customization in electronic calendars. You can specify that you're interested in marine life or wildflowers, for example, and your PC Planner will be created accordingly, complete with thematic pictures, tips of the day, trivia, events, and e-commerce options.

■ **What's Not.** Avid calendar users don't want a product that only utilizes paper; they need much more than that to adequately plan event after event in their complex schedule.



This New York Yankees planner is an example of the personalization that can be achieved with the PC Planner.

Static or disconnected calendars. Although the calendar that hangs on the kitchen wall and the day planner book you carry in your pocket have their purposes, they really don't meet the demands of the Internet user. In fact, as we mentioned earlier, even electronic calendars and planners that come in the form of software may not necessarily be adequate if they are disconnected. As Mancini says, "You're out of luck if it can't be used to connect with others." By "connect with others" he is referring to features such as group scheduling and sharing information.

People need much more than a mere database to keep track of their contacts and a static calendar to simply hold their appointments. "They want something that's interactive ... something that isn't just a calendar, but more of a personal time-contact-event manager," McManus says. If all the calendar or planner's features—the calendar, contact manager, task list, e-mail, etc.—can't integrate and work together, you're looking at a calendar or planner that's definitely not sufficient.

Gimmicky calendars. The wise calendar user, according to Mancini, should avoid calendars that purport to become the center of your world. Users should also look past the gim-

micky bells and whistles in which many calendars specialize, including customized alarms that go off at different times or other such features that don't really have to do with the actual functioning of the calendar. Calendars that fail to offer the substantial "meat-and-potatoes" features, such as group scheduling or event directories, that people actually use every day don't fall into the hot category anymore, either.

Impersonal calendars. Customization has become a buzzword in the computer world today, and the world of electronic calendars is no exception. A calendar that won't let you check the movie listings or the weather in your local area isn't hot today. You want to look for an electronic calendar or planner that can wrap itself around your life and needs.

■ **What's Next.** Dedicated calendar users have so much to look forward to, especially concerning the integration of wireless technologies.

Personal destinations. McManus foresees that the electronic calendars and planners of the future will become more established as people's personal destinations. By doing so, these innovative electronic calendars will be where users can find everything that they need, from meeting appointments to sporting events to shopping to whatever else one might need during any given day.

Increased integration of tools. Many of today's electronic calendars and planners already offer the hot feature of tool integration; that is, the pulling together of calendar, contact manager, task list, e-mail, and more into one functional unit that operates in unison. You can expect to see more calendars and planners that allow users to employ multiple tools to jointly accomplish tasks in the future.

Integration with wireless technologies. The integration of planners and calendars with wireless technologies represents a big "next" step for this industry. Both McManus and Mancini expressed visionary goals for taking their respective products to this next level of accessibility and convenience.

Currently, the connected, on-the-go user can download his or her electronic calendar information to his cellular phone or handheld device for later viewing, but even this is not enough. McManus says that soon you will be able to access all of your information using your cellular phone, handheld device, or any other wireless technology. You'll then be able

Terms To Know

e-commerce—Electronic commerce is the practice of buying and selling goods via the Internet.

group scheduling—A feature of electronic calendars that you can use to help schedule an event with a group of people.

integration—Pulling several different tools together, such as your contact list, e-mail account, task list, and calendar, to make them work in unison and help you accomplish tasks with minimum effort.

synchronization—The ability to connect your calendar to another calendar or handheld device and update the information from one source to the other.

to use this information in an interactive way as though you were sitting in front of your Internet-connected computer at work.

Mancini envisions people programming their electronic calendars to send reminders on their pagers. He also predicts that users will soon be able to "call" their Web-based calendars from their cellular phone to "hear" their daily appointments. He says tomorrow's users might even be able to use their handheld devices to connect to the Internet and synchronize with their calendars in real-time when they're away from home or the office. And maybe, just maybe, people will someday be able to view their electronic calendars via their WebTV, even if they don't have a computer, and see their daily entries on-screen just like the channel listings appear to cable television users.

■ **What's Now.** We understand that some people really don't want to be reminded about their daily appointments and responsibilities. The easy-to-walk-away-from kitchen calendar is much more convenient for them when they want to "forget" obligations. But, to those who've realized that they need organizational assistance, we can assure you that somewhere there's an electronic calendar with your name on it to help you stay on top of your day—anytime, anywhere. [E]

by Hannah Henry

Stefanie Syman

co-founder feedmag.com

edits her own e-zine

books her own e-tickets



nwa.com

check fares • select seats • buy tickets • work smart • Northwest Airlines

Internet Telephony

Make The Call When Quality Improves

Internet telephony, which some people refer to as Internet Protocol (IP) telephony or voice over IP (VOIP), allows voice transmissions (phone calls) to travel over the Internet rather than via traditional phone equipment. Internet telephony has been one of technology's hottest applications since 1995. That year, a company called Vocaltec introduced its Internet Phone software, which allowed computer users to communicate over the Internet via their multimedia-enabled PCs.

So many people are interested in Internet telephony for one reason: money. Because Internet service providers (ISPs) don't charge customers for long-distance data transfers, phone calls don't incur long-distance charges either. That makes Internet telephony attractive not only to individuals but also to corporations that spend a lot of money on long-distance charges. Unfortunately for all these eager penny-pinchers, today's VOIP quality simply isn't as good as traditional phone calls. As a result, this development has been mostly a curiosity for the past few years.

Once Internet telephony quality improves enough to be plausible, the market will be huge. The technology research firm International Data predicted that worldwide VOIP usage would explode from about 2.7 billion minutes in 1999 to 135 billion minutes in 2004. That's a huge jump from 1998, which saw only a paltry 310 million minutes of use. IDC predicts that revenues, which are generated from hardware and software sales as well as access fees, will



skyrocket from \$480 million in 1999 to \$19 billion by 2004.

Internet telephony is made possible by the same combination of hardware and software that enables phone calls. For two-way (speak-and-hear) calling, you'll need a full-duplex (two-way) sound card to process the sound, a microphone and speakers, and an Internet connection.

You'll also need software to complete the link between the Internet and your hardware. You'll find a number of free software solutions for Internet telephony; these range from voice chat at Web portals such as Excite (<http://www.excite.com>) to conferencing products such as Microsoft's NetMeeting (<http://www.microsoft.com/netmeeting>). Be aware, however, that there are limitations within the hardware, software, and Internet

connections. These limits will give you the most trouble when dealing with Internet telephony.

For sound to be processed by a computer and transmitted across long-distance digital telephone lines, it must be digitized (converted to a series of ones and zeros). Because the vocal inflections of speech and the multitone ranges of music are very complex, this conversion results in a substantial amount of digital information for each word or note. Digital telephone lines and cables can transmit this information reliably and efficiently, but Internet technology, which originally wasn't designed for real-time audio (or video), can't handle it as well.

In order to squeeze these bulky blocks of data across normal Internet connections, the information is compressed before transmission and then decompressed on the receiver's end. Right now, the technology is far from perfect because data is sometimes lost in the process and connections often aren't as fast as they should be to carry these

heavy loads.

Compounding these issues is the fact that while phone lines carry only voice traffic, Internet connections transmit other data that competes for the available space. The result is often jerky, inaccurate sound reproduction.

Further complications occur because not all software products support the same standards, so users must use identical software on both ends to achieve a connection. (Imagine not being able to call someone unless you were both using Lucent phone systems.) The three problems of speed, transmission reliability, and interoperability have been the main impediments to the acceptance of Internet telephony.

■ **What's Hot.** As these issues are being overcome, auxiliary products and services are being developed at a dizzying pace. Here's a

What's HOT

- Internet/phone connections
- Internet faxing
- Video calling and conferencing

What's NOT

- Slow connections
- Poor quality
- Inadequate equipment

What's NEXT

- Computer telephone integration
- Networking via personal appliances
- Convergence and interoperability

look at some of the hottest advancements in the field.

Internet/phone connections. Installing special software and speaking through your computer's microphone may sound like fun to Internet aficionados, but what happens when you want to call someone who doesn't even have a computer? And what if you don't feel like messing with your computer at all?

In the past few years, computer-to-phone and phone-to-phone connection products and services have sprung up that enable you to use the Internet for your voice calls. Companies such as Net2Phone (<http://www.net2phone.com>) allow any Internet user with a sound-equipped PC to initiate calls from a computer and transmit them over the Internet to telephone switches. These switches automatically relay the call to any telephone in the world.

If you use an intermediary service such as Net2Phone, you'll have to pay a small fee for using their switching equipment and for the portion of the time before your call is routed through the Internet, but the process usually offers substantial savings over traditional long-distance service.

You can completely eliminate the computer by purchasing special equipment, such as Komodo Technology's Komodo Fone (\$99; <http://www.komodofone.com>). The Komodo Fone, and other equipment like it, replaces your computer for making Internet phone calls. You simply plug your telephone into the Komodo Fone, which you then plug into a telephone jack. The Komodo Fone places the call for you using your ISP. You can call another telephone number directly, and you'll pay long-distance charges only for the minute or so it takes for your call to be switched to the Internet. If the person on the receiving end has a Komodo Fone installed, you can call each other for free using special "Fone" numbers.

Products and services in this category are rapidly filling the marketplace, and traditional telephone companies are looking into using the Internet for call transmission, as well. For

more products and information, you can visit CT Depot at <http://www.ctdepot.com>.

Internet faxing. Just like you can use any phone line to send a fax with the proper equipment, any Internet connection will, too. The trick lies in making sure the message goes out in a format that works on the other end.



Komodo Technology's Komodo Fone

Many programs today can save files in a faxable format. In addition, most Internet fax software has built-in conversion capabilities. Try several to see which works best for you; you can find them at popular software download sites such as Tucows (<http://www.tucows.com>).

Receiving faxes over the Internet is just as easy as sending them, but again, it requires software that can save the fax in a format you can read. You also must have an Internet-based fax phone number. Several free sites will provide you with an Internet fax link; we like JFAX.COM (<http://www.jfax.com>) because it allows you to receive faxes and voice mail for free, and it offers fax-sending services at very low rates.

Video-enhanced calling and conferencing. Once you've made the initial leap to audio phone calls over the Internet, adding video is only a small step (and as little as \$100) away. You can also host multiparty conferences, in which groups of people can see and hear each other as they speak.

To enable your computer to send and receive video, you'll need a video-capture card and camera or a camera that has built-in

video-capture capabilities. (However, using a separate capture card usually results in better quality and performance.) As with audio calling, you and your call recipients will have to have the same software installed. Many solutions for audio conferences also support video (NetMeeting does). Again, the trick here is to find the solution that works best for you. If you want really high-end reproduction with lots of bells and whistles, be prepared to pay for it. In this case, you'll need a high-speed cable or Digital Subscriber Line (DSL) connection to support it.

Auxiliary services. Another hot area in Internet telephony right now is the auxiliary services market. Because the quality of the calls can't be perfect, vendors are hoping to lure you to their technology with perks, such as faxing, voice mail, and other services common to traditional systems. If you're planning to use a free service, find the one with the most benefits before you sign up.

■ **What's Not.** Even though Internet telephony hasn't fully evolved, some facets just aren't worth considering. As the technology gets better, we can safely say the following won't be involved.

Slow connections. Considering that most people have a 56 kilobits per second (Kbps) or slower modem, and that most full-motion audio and video can consume as much as 10 megabits per second (Mbps), it's no wonder that slow Internet connections are affecting the acceptance of Internet telephony. Help is on the way in the form of DSL and cable modems, which offer transmission speeds ranging from 150Kbps to 10Mbps.

If you are still working with a 28.8Kbps or slower modem, your audio transmissions and receptions will be rife with latency (lag time), but at 56Kbps, you'll be in pretty good shape. To transmit the best-quality audio and video, however, you'll want to splurge on a faster connection.

Poor quality. An even bigger problem with using the Internet for audio and video is the transmission quality. Remember the

To enable your computer to send and receive video, you'll need a video-capture card and camera or a camera that has built-in video-capture capabilities.

compression we talked about earlier? Transmission software uses coding/decoding algorithms, known as codecs, which are supposed to shrink and then expand data in the most effective manner.

Depending on how they are written, codecs trade off a mixture of compression/depression speed, bandwidth, and audio/video quality. Unfortunately, many Internet telephony programs use low-speed codecs that were built for older modems. With these low-speed codecs, the speed of your connection won't matter a bit, no matter how fast it is.

When you choose your Internet telephony software, be sure it's pretty new and find out if the codec it uses can take advantage of your connection. Look for software that supports the transmission protocols of G.723.1 (for audio) and H.323 (for video conferencing). These protocols (which incorporate codec specifications) are quickly gaining wide-

view the products in action or be prepared to live with the consequences.

■ **What's Next.** To reiterate, Internet telephony is an up-and-coming technology that has many people excited. However, the technology that is on the horizon may push Internet telephony into the mainstream.

Computer telephony integration. A close relative of Internet telephony is computer telephony integration (CTI). CTI is using your computer to process phone calls, faxes, voice mail messages, and more. CTI doesn't affect how the call is transmitted, but rather what happens to it when it arrives. You can also use CTI with traditional phone connections via special cards and servers. CTI is already becoming a popular application for businesses and is available as a third-party add-on for consumers. We're betting it will eventually become a standard feature of consumer computers.

Imagine this: Every call you make goes through your computer, which can automatically access a database of every telephone number in the country. If the person you're calling isn't home, you can leave a message that will automatically pop up on his or her computer or be rerouted to a cellular phone, pager, or other wireless device. And, because the call was placed through the Internet, you can choose to convert your message into e-mail. In addition, you'll probably be able to complete the entire process without touching your keyboard because voice activation will handle it all.

Personal appliances. It used to be that people were tied to the Internet by their desktop computer. That's already changing and will continue to do so. In the next five years, a number of devices will hit the market that will allow you to send and receive e-mails, phone calls, voice messages, and faxes via the Internet no matter where you are. Handheld devices, wall-mounted keypads, and airport kiosks will all be wired for Internet access and enabled for voice and video transmission.

Convergence and interoperability. The two advances we've just mentioned are both a function of the convergence that is presently taking place among telecommunications, computing, and data networking. As these three groups merge, the lines will continue to blur, with the benefits being obvious through enhanced ease of use and access for the consumer.

Terms To Know

bandwidth—A measurement of how much information can be sent through a network or Internet connection in a given amount of time.

codec—Short for compressor/decompressor, a codec is any technology that handles the compression and decompression of data.

computer telephony integration—The merging of computer and telecommunications functions so that you can use a computer to send, receive, process, and store information related to telephony.

gateways—Points on a network that act as intermediaries between a sender and receiver. Gateways often add value to the transaction, such as converting the data from one format to another.

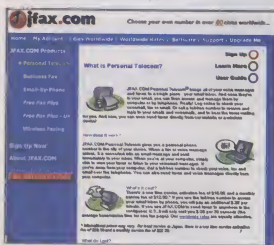
latency—Lag time, or the period of time that one part of a system is waiting for another component to catch up. Excessive latency spawns echo, in which a message has time to bounce back to the speaker before the listener hears it.

packets—Blocks of information that have been converted to digital format and compressed for transmission across data (Internet or network) connections.

However, before the merger is complete, standards must be agreed upon and systems must be opened so all pieces of the puzzle can work with each other. Anyone who remembers the days of Beta and VHS videotape formats will understand that a technology cannot achieve its full potential until everyone is working from the same foundation.

Just as the telephone revolutionized communication more than 100 years ago, the Internet will transform telephone communication in the near future. But until the issues of standardization and quality are resolved, the results may be disappointing for many. Nevertheless, better products are just around the corner, and if you jump in now, you'll be ready for the revolution. [E]

by Jennifer Farwell



JFAX.COM is an Internet-based service that provides a variety of free and fee-based fax and phone services.

spread acceptance as industry standards. To find out more about codecs, visit Codec Central at <http://www.terran-int.com/CodecCentral>.

Inadequate equipment. The fastest connection and most efficient compression technologies can't make bad input sound or look better. If you are still dealing with an old sound card and microphone, shell out a few bucks to upgrade them. Before you buy a video camera, consider teaming it with a top quality video capture card, as well.

As with most technology, the difference between good equipment and junk can be enormous. Few of us can afford a \$100,000 video conferencing setup, but buy the best you can afford. Furthermore, always listen to and

Online Education

Broadband Internet Access Will Put More People On The Learning Curve

Grandpa's maxim, "When I was your age, I walked through the snow three miles to school" makes little sense in today's electronically wired society, where Internet-based virtual campuses serve as alternatives to the traditional classroom. Today, individual courses, a host of online graduate degree opportunities, and virtual field trips are readily accessible in cyberspace.

Students of all ages choose online distance learning for the same reason they took correspondence courses by Pony Express more than 100 years ago: convenience. The "campus" is open around the clock, and you can read lectures delivered over the Web at your leisure. In addition, you can download, print, or import course materials into your word processor and then edit them or add your own comments. And maybe best of all, there's no missing a class because you overslept.

Learning over the Internet also makes sense for people who live in remote locations without access to universities or community colleges or for those who are hemmed in by inflexible schedules. Online education also makes class accessible to people with disabilities and limited mobility. Finally, students on limited budgets can easily go on interactive virtual field trips to distant locations.

In an online class, students typically complete course work as their schedules permit and communicate with the instructor and classmates through e-mail or real-time chat.



Minimal peer interaction is a small price to pay in exchange for the opportunity to obtain an education, develop new skills, and earn a fully accredited degree without attending regularly scheduled classes on campus.

■ **What's Hot.** There are so many online courses and degree programs available that it's easy to get lost in all the offerings. You can browse course listings using a search engine such as Yahoo! (<http://www.yahoo.com>). Enter online education as your search phrase and follow the links that look interesting. For example, clicking the Education > Distance Learning > Course Online category match takes you to a Web page with online course offerings listed by areas of concentration. To

narrow the search, click a particular study area.

For example, selecting Environment And Nature gives you options in environmental studies. If you click Global Sustainability—University of California at Irvine, you'll see three online undergraduate courses UCI offers.

The school's Web-based classes are open to qualified students anywhere in the world. To register, you must have Internet access, an e-mail address, consent from the instructor, and a supervisor at a nearby college or university who is willing to provide a place for you to take exams. Every online course UCI offers is worth four units of University of California credit. Registration costs \$425 per course.

Other search engines, such as Excite (<http://www.excite.com>), Google (<http://www.google.com>), and Snap (<http://www.snap.com>), provide links to interesting online educational opportunities. Just type **online education** or **distance learning** as your search term. Finally, to see an excellent site dedicated to information about a variety of online course offerings, check out Glenn Hoyle's Distance Learning On The Net (<http://www.hoyle.com/distance.htm>).

Computer users with disabilities now have several online educational options available through We Media (<http://www.wemedia.com>), which is a Web portal dedicated to empowering people with disabilities. Click the We School link to learn more about quality educational options offered through the Internet. These courses rely on technology to deliver education to disabled people. In fact, We Media is offering real-time two-way video classes from several leading universities via high-speed Digital Subscriber Line (DSL) and cable networks.

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What's HOT

- Multimedia-enhanced online lectures
- Real-time chat and Q&A sessions
- Opportunities for people with disabilities

What's NOT

- Institutions that take your money but offer little in return
- Classes that require you to be physically present for exams

What's NEXT

- Greater variety of courses
- More real-time audio and video
- Interactive lectures



Computer users with disabilities now have several online educational options.

■ **What's Not.** It's a student's market for online courses, but when you're shopping for a class, be careful you're not throwing your money away. Institutions that promise degrees or certificates but lack the credentials to make good on their claims will take your money but provide little in return. Here are some things to look for.

First, before registering for a course or making any payments, be sure to verify the course provider's credentials. A provider's home page typically has a link to an "About" page; read this to determine if the selected institute or organization is registered with any state agency. There should be information about the courses the school is licensed to provide. Contact one or more of the listed agencies for verification.

Second, be sure you know the course requirements before you sign up. Some courses require you to be physically present on campus to take exams. Don't register if you can't be present. Also, make sure you are properly equipped to take the course. Sometimes, you need a particular browser or a high-speed connection to the Internet. Be sure you're ready to invest in the necessary hardware or DSL/cable connection required to take the course.

Third, just because you're involved in distance education doesn't mean you should be learning in isolation. If there is no way to interact with the instructor so he or she can answer your questions, or if you can't meet over the Internet to chat with other course members, you're not going to get everything you can out of the class.

Finally, to apply online course credits toward a degree at another institution, you must check with your degree-granting institution to ensure that credits are transferable. You are responsible for getting the approval of your professional association if you plan to apply the credits toward continuing education requirements.

■ **What's Next.** Often, the benefits of online education outweigh the absence of face-to-face interaction with faculty and classmates. As computer technology grows more powerful and Internet bandwidth increases, online course content will move away from text reports and static PowerPoint presentations to multimedia-enriched, real-time interactive animated lectures.

Most home computers still connect to the Internet through analog modems that are limited to 33.6 kilobits per second (Kbps) or 56Kbps transmissions. However, multimedia-enriched lessons delivered in real-time demand fast connection speeds. Otherwise, streaming audio and video and three-dimensional (3-D) effects take too long to download. When users get stuck on

annoying performance glitches, such as jerky animation and audio that cuts out, the overall learning experience suffers.

Speedy Internet access via cable and DSL networks will fundamentally change the online learning experience. Both cable and DSL connections can be left on all the time, which allows you to use software agents that communicate from computer to computer without your interaction. Presently, cable and DSL service are available in larger cities, but they are fairly expensive. When prices drop and high-speed access coverage expands, course content and its delivery methods will dramatically change. [E]

by Carol S. Holzberg, Ph.D.

Terms To Know

broadband transmission—

High-speed Internet data transmission, especially that carried by cable modem or Digital Subscriber Line (DSL) technology. With faster access and transmission speeds, the Internet has greater possibilities for users. This is especially true for video and audio on demand.

cable modem—A modem

that uses your cable TV connection instead of a phone line to connect to the Internet. Because the bandwidth of coaxial cable is much higher than that of the standard phone line your telephone company uses, the speed advantage of cable modems vs. regular phone modems is profound. Cable modem speeds range from 500 kilobits per second (Kbps) to 10 megabits per second (Mbps). The top speed of phone modems, by comparison, is almost 10 times slower at 53Kbps.

Cable modems' fastest speeds are for downloading; you won't be able to send data nearly as fast because cable TV networks are designed primarily to send information out to homes. Overall speed also varies widely because bandwidth on a cable TV network is a shared resource. If everyone on your block signs up for cable modem service and downloads large files, the available bandwidth (and speed) will drop dramatically.

chat—A special forum that

enables two or more people who are online at the same time to engage in "conversation" by taking turns typing messages. When a participant types a line of text and presses ENTER, the words appear on the computer screens of others present in the chat room.

Digital Subscriber Line

(DSL)—DSL technology permits Internet service over

the broadband portion of standard copper phone lines at download speeds of up to 6.1Mbps. By taking advantage of unused frequencies on existing phone lines, a DSL connection is able to carry both data and voice signals simultaneously. In addition, the data connection is continuously active. Typically, users can expect to download data at speeds ranging from 512Kbps to 1.5Mbps, depending on customer region and distance from the central office. DSL modem transmission speeds to upload data are likely to be about 128Kbps.

distance learning—The

learning experience that takes place when student and teacher are not in the same physical location. Teaching can take the form of lessons presented through videoconferencing or text-based files that you download from a Web server.

Shopping Sites

Make Purchases From Home With Wireless & 1-Click Purchasing

You've seen the barrage of ads for dot-com companies on television. You've heard the latest Internet buzzwords. You've even purchased an item or two online. But recently you've begun to wonder, "What's this online shopping hype really all about? That's what we're here to tell you.

■ What's Hot. The Web is quickly becoming a multibillion-dollar enterprise for the world's businesses. Its quickness and convenience keeps margin-sapping middlemen at bay. According to International Data Corp. (IDC), global Internet spending reached \$111 billion in 1999 (more than doubling the \$50 billion spent in 1998). And Forrester Research estimates that the number will rise to as high as \$1.3 trillion by the year 2008, representing over 9% of all U.S. sales.

So what shopping sites are catching the eye of the consumer? What separates the haves from the have-nots in this brave new world of Internet profits? PC Data Online, an Internet market research firm, ranked the top 20 E-tail Websites for November 1999 among U.S. home Web users. A quick top 10 list would include the following players: Amazon.com, Buy.com, eToys.com, barnesandnoble.com, iPrint.com, drugstore.com, PlanetRx.com, Landsend.com, Ticketmaster.com, and MotherNature.com.

In another indication of the vitality of e-commerce sites, Media Metrix released its lineup of top 10 e-commerce sites for the week of Thanksgiving 1999: Amazon.com, eBay.com, Toysrus.com, eToys.com, CDNOW.com, VitaminShopper.com, barnesandnoble.com,

buy.com, Expedia.com, and Shopping.yahoo.com.

From month to month, week to week, and even day to day, e-commerce sites jockey for position. This means that most of these Internet big wigs have figured out a thing or two about what works on the web. We've dissected some of the latest trends to give you insight into Internet shopping.

1-Click checkouts. In July of 1995, Amazon.com paved the way for virtual book stores everywhere. It still leads the pack and offers a diverse array of items including books, electronics, toys, and home improvement.

Those wondering what made Amazon.com king of the e-commerce jungle should know that the company identified ways to simplify the shopping experience. In September of 1997, the site introduced its 1-click technology, which streamlines the online ordering process. Specifically, 1-click technology stores customers' billing and shipping information and allows them to purchase items with just the click of a button instead of having to enter their shipping and billing information every time they buy.

1-click is hot in the courts and on the Web. On September 28, 1999, the U.S. Patent Office awarded Patent No. 5960411 to Amazon.com for 1-Click. Less than a month later, Amazon.com filed suit against Barnes and Noble for using a similar feature on barnesandnoble.com (bn.com) claiming patent infringement over its 1-click scheme. A preliminary injunction forced bn.com to change its checkout system.



Many people protest the patenting of business models and software features that seem obvious. Richard Stallman, an open-source software advocate, has called for a boycott against Amazon.com because of the company's existing monopoly on 1-click technology. (See <http://www.gnu.org/philosophy/amazon.html> for more information.)

E-bidness: Online auctions. Americans love the thrill of bidding on that one-of-a-kind item, which is why person-to-person auctions have become the most popular auctions on the Web. Just about everyone has heard of the online trading powerhouse eBay. The San Jose-based company has been touted as the largest one-to-one trading community online and one of the most popular Internet sites in the United States.

But eBay isn't the only site to cash in on the big "bidness" associated with online auctions. Amazon.com, Yahoo!, and a host of others have added auctions to their sites. Person-to-person auctions are hosted by virtual houses that never actually own merchandise or deal with shipping or fulfillment; this is unlike merchant auctions which run on a surplus model. Online auction houses simply link buyers with sellers. Some sites charge a nominal fee for this

What's HOT

- 1-Click
- Online auctions
- Wireless shopping
- Click and mortar

What's NOT

- Complicated ordering
- Flea markets
- Long download times
- Brick and mortar

What's NEXT

- Patent disputes
- Internet taxation
- Convergence
- E-cash

service. Others, such as Yahoo!, allow sellers to conduct auctions for free.

The idea of placing a cyber-bid can be pretty exciting. But before you get caught up in the world of online auctions where bids usually aren't retractable, it's important to remember that you'll be dealing directly with the seller to complete the sale. To avoid a fraudulent transaction, most sites recommend taking a few precautions. Suggestions include dealing only with members who have built up good ratings on the site, verifying information about your trading partner, and paying by credit card or COD. For more information, visit the National Fraud Information Center at <http://www.fraud.org/internet/inset.htm> or refer to the FTC's "Going, Going, Gone" alert at http://www.ftc.gov/bcp/condi/RTF_bookmark.stm. [HT4697484 08] [RTF bookmark end: HT469748408] [pubs/alerts/goneart.htm].

Downloadable products. CDNOW.com, which appears in the number five slot on Media Metrix's top 10 list not only lets you purchase CDs over the Web but also employs technology that delivers music to your desktop rather than doorstep. The download option is one reason why computer software-related sites have been making such a name for themselves in the e-commerce arena. Like music, software programs can be downloaded (from sites such as Buy.com and Beyond.com) right to your PC. That means no more trekking to the store to pick up your order or waiting for the brown United Parcel Service (UPS) package to appear at your front door.

Wireless shopping. You can already browse and shop on the Web without a computer. Barnes and Nobel recently introduced bn.com On The Go, a wireless shopping application that can be downloaded for use on the Palm VII (<http://www.palm.com/products/palmvii>) organizer, which is a wireless personal digital assistant (PDA). Consumers can download the application from the Internet, perform a HotSync using their Palm VII, and then search through titles online, place or check orders, locate stores, even send electronic greeting cards. Alta Vista offers a similar package called Shopping.com Everywhere, and

Amazon.com has introduced Amazon.com Anywhere to provide Palm VII users with a portable version of the shopping site.

The afore-mentioned PDA applications can be found at Handango. Industry analysts at IDC state that annual sales of PDAs are estimated to grow to more than 32 million by 2003. In response, software developers are creating applications that extend the functionality of handheld devices. Handango (formerly the GoPDA network) has collected these programs to provide easy access to users looking for PDA software. Mobile professionals can visit <http://www.handango.com> to try out or purchase downloadable handheld applications; new ones are being introduced daily.

Live customer service. When all else fails in the attempt to make an online purchase, consumers need to know that they can still reach out

and touch someone. "The ad campaigns make it look so easy," says Robert LoCascio, chief executive of LivePerson, a provider of live customer service for Web sites. "But when you try shopping online, it's just a bunch of graphics. You're expected to figure it out on your own." Contrary to LoCascio's implication, companies should not offer live customer service to compensate for a confusing site. Assuming that the site is well designed, customer service can help make the Web a more personal place, increase trust, and generate additional revenues. As PC Data's top 10 list illustrates, Landsend.com leads the pack in the apparel category. The site provides real-time customer service. Using interactive software, you can chat online with a live customer-service representative. Service reps can even push information to your PC so you can share pages and discuss products with them.

What's Not. Technology for technology's sake. Some online e-tailers use animations, marquees, pop-up windows, three-dimensional

interactive models, multiple browser windows, and just about anything else you can think of to overload potential customers with everything *but* product or purchasing information. For example, Boo.com is an online retailer of fashion and sportswear that uses all these techniques. The site claims that "a cutting-edge Web site" will serve as the vehicle for the company to become "the world's leading online retailer of fashion and sportswear." On the contrary, the site prevents users from locating or purchasing items quickly and easily. While boo.com achieves a youthful look, its bells and whistles can be extremely confusing to buyers.

Other technology abuses include the use of audio for audio's sake. One user writes, "If my computer starts playing music, those around me are likely to assume that I am just playing games. At the very least, it lowers the credibility of the information and, in the increasingly common cubicle farms, is disruptive to those around me. I immediately back out of such a site, and then consider if it seemed so valuable that I should adjust my sound level and re-enter, or just go somewhere else. The situation is quite different when a click is required to fire a sound file off, and I can make a choice."

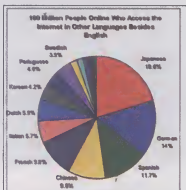
Long download or response times. Internet visitors are called Web surfers with reason. Like channel surfers, our attention spans are limited. At the slightest delay, we abandon ship. Even with recent advancements in bandwidth growth and modem speeds, 62% of Web users still complain that Web sites are too slow. According to Web consultant Jakob

Nielsen, "Slow response times often translate directly into a reduced level of trust, and they always cause a loss of traffic as users take their business elsewhere."

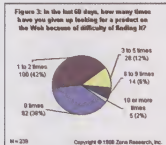
Unsolicited e-mails. In this age of information, most of our e-mail boxes are already overflowing with mail. Some shopping sites have made a habit of sending unsolicited e-mails to visitors. Others trick users into registering for mailings

they don't want. Many sites don't even offer an unsubscribe option. These kinds of abuses make customers wary of giving away personal information, especially e-mail addresses and billing information.

User-hostile sites. A Zona Research study conducted last year indicates that nearly



According to <http://gfireach.com/globstats>, the internet is gaining momentum in non-U.S. countries.



Sixty-two percent of consumers give up if they can't find what they're looking for on a site.

one-third of online shoppers say that it is still "somewhat or extremely difficult" to locate specific products on the Internet. Sixty-two percent say that they abandoned all hope of finding a particular product on the Internet at least once in the previous two months. According to Sonia Mari, e-commerce product manager for Alpha Technologies, a leading e-commerce consulting firm, "The customer experience has always been the key driver of success in retail. On the Web, usability is a large part of that experience. Beware of overnight experts. Customers need to be able to find what they are looking for quickly and easily, and there is a science to that. At Alpha Technologies we work with our clients and their customers to ensure that the process of shopping is seamless, intuitive, and transparent from browsing to checkout."

■ **What's Next.** Taxation. The Internet has emerged as a tax-free zone of sorts. Today, sales taxes are collected on Internet purchases only if an e-commerce merchant is based in the buyer's state or has a substantial physical presence in the buyer's state. By April of 2000, the Advisory Commission on Electronic Commerce, which was established under the Internet Tax Freedom Act of 1998, will recommend an Internet taxation policy to Congress.

"The commission has become pretty well divided," says Kent Johnson, KPMG LLP's national partner-in-charge of Electronic Commerce Tax Solutions. A number of state and local government officials position that the current three-year tax moratorium, which was approved by Congress in 1998, is eroding taxes that support basic government functions. Internet taxation advocates state that the moratorium could deprive state coffers of more than \$10 billion a year by 2003. Taxation opponents, on the other hand, reference studies that indicate minimal erosion of tax dollars and suggest that economic growth spurred by e-commerce actually expands government tax reserves.

■ **E-cash.** E-cash (electronic cash, also called digital cash) is a form of electronic currency designed for the Internet. Like physical money, e-cash is anonymous and has immediate value. This type of payment mechanism should resolve the security problems related to the use of credit card numbers on the Internet. Some companies developing this form of currency are CyberCash, DigiCash, and Net Cash. Digital coins are even being developed, which allow buyers to purchase items over the

Internet in small denominations. Digital cash transactions are expected to increase this year.

■ **Globalization.** The Web has helped barriers come down between countries. Yet, while the U.S. market is faced with an outright e-revolution, the rest of the world seems to be engaged in a game of catch-up. Some believe that it won't be long before the scales even out. The recent introduction of the Euro (a common currency for the European Union) means that Europe will essentially become a single market by the end of this year, which will help drive the growth of e-commerce in European markets. Connectworld (an affiliate of the French media group Havas) has conducted a study of European e-commerce. According to Connectworld, the real explosion in Europe will be in 2001 to 2002, when 80 to 100 million Europeans will be online. (There are 35 million Europeans online today). Connectworld predicts that European e-commerce sites will quintuple by 2002.

■ **Electronic middlemen.** Cutting out the middleman (a process referred to as disintermediation) has been a driving force behind the online shopping revolution. Rather than use traditional retail channels, Web-based companies sell directly to networked customers, making transactions cheaper and faster. For example, according to an MIT Sloan School of Management study, book and music prices are 9% to 16% lower online than in physical storefronts. However, the new e-economy does not necessarily make the intermediaries obsolete.

Some experts believe that suppliers will soon find it necessary to sell their products or services through Internet intermediaries. In fact, some believe that these cybermediaries will become more necessary as more information becomes available and more connections are possible. Rather than deal separately with many suppliers, buyers will gravitate to these organized electronic stores. Intermediaries may be able to offer value-added services that most manufacturers don't have the time or inclination to offer. For example, because intermediaries deal with multiple manufacturers they will be able to respond to customer requests to deliver multiple products in a single shipment. New intermediaries can also provide information (on competitive pricing, etc.) and offer consumers one-stop information gathering before they set out to make their purchases. Cybermediaries can also provide high levels of customer service. According to Rob Rodin, CEO of Marshall Industries, an online distributor of electronic components, "Technology can link buyer to manufacturer,

Terms To Know

■ **click and mortar**—A term likely coined by David Pottruff, president and co-chief executive at Charles Schwab, which is used to refer to a business that has both brick-and-mortar stores in the physical world and an online retail presence. For example, Barnes and Nobel is a click-and-mortar store, as opposed to amazon.com, which is an Internet purebred.

■ **e-business**—Often used interchangeably with e-commerce, e-business refers not only to buying and selling goods online, but also to using the Web to service customers and collaborate with business partners.

■ **e-commerce**—Electronic commerce; the buying and selling of goods and services on the Internet. Electronic commerce incorporates both business-to-business (B-to-B) and business-to-consumer (B-to-C) transactions.

■ **e-tailing**—The selling of retail goods on the Internet.

■ **portal**—A web site that acts as a guide to online retailers. Portals offer a broad array of resources and services, such as online discussion groups, e-mail, search engines, and online shopping malls.

but that's not enough. Time is a precious resource. Middlemen have the opportunity to provide superior customer service because it's their sole focus."

■ **Convergence.** Convergence is the idea that the most powerful devices of the 20th century (for example, TVs, PCs, telephones, mobile devices, ATMs, home/office appliances, etc.) will connect to the Web and merge into one seamless information system. It's happened in the past; for example, the fax machine was born out of a convergence of telecommunications, optical scanning, and printing technologies. Many people wonder if this will repeat itself in the virtual world.

The world of e-commerce will likely not stand still. Stay tuned. [E]

by Gina Hertel

Auction Sites

This Segment Of E-commerce Is In A Positive Bidding Frenzy Of Its Own



Online auctions represent one of the fastest growing means of buying and selling on the Internet today. Their "hot" features and functions sizzle and steam, while their "not so hot" features smolder and smoke. And when it comes to what's next on the burner for auction Web sites, a bright and busy bidding future is predicted for all.

While preparing this article, we spoke with Tim Black, president and CEO of BidHit.com (<http://www.bidhit.com>), and Theresa Amos, director of corporate marketing at boxLot.com (<http://www.boxlot.com>). Both of these auction sites seem to thrive in today's fast-paced Internet-driven market, basking in the increasing popularity of e-commerce.

BidHit.com has been in existence for three years now. It represents the business-to-consumer auction model, where everything is either brand new or factory refurbished. (And

everything ships under a warranty.) All products come from only certified BidHit.com merchants, and all transactions are handled via credit card or bank card—no cash allowed.

Other types of auction sites, such as boxLot.com, operate a bit more like your neighborhood garage sale, with private individuals placing their personal belongings up for bid. Though each auction site conducts business in a slightly different way, they all express similar opinions about what's hot, what's not, and what's next in the online auction world.

■ **What's Hot.** Good customer service. The assurance of adequate security. Knowledge about how to get the best deals. The difference between what consumers want from online auction sites and offline stores doesn't seem all that different, does it?

Security features. Security made the top of both Black and Amos' list of hot auction site features. Black told us that consumer protection is a big issue in the online auction segment of e-commerce right now. Many people are concerned about encountering privacy and fraud online. Some have been burned in the past, and some are afraid to even give online auctions a try.

"It's very important for online auction sites to make their customers feel secure about purchasing through them," Black explains. After all, people won't shop at an auction site that's not secure, and by their very nature,

auction Web sites are prone to fraudulent behavior.

The personnel at boxLot.com take a proactive approach to security. According to Amos, they screen each person who registers as a bidder or a seller. If the screening reveals anything slightly suspicious, such as a name and address that doesn't match, the registration is kicked back for further investigation.

"If they're not even honest in their registration process, we don't know that we can trust them to be honest in their transactions, either," says Amos. The site also conducts keyword searches that pick up on questionable words, such as "replica," listed with items. This enables boxLot.com to weed out bad items, sometimes before they even go live.

What's more, bidders and sellers can take their own proactive steps toward personal security and protection. Amos told us that at boxLot.com, they encourage consumers to use an escrow service, such as i-Escrow (<http://www.iescrow.com>) or Tradesafe.com (<http://www.tradesafe.com>), when they buy or sell high-dollar items. The services of these escrow companies are popular with auction site bidders and sellers because they help ensure that the seller receives his payment and that the bidder is satisfied with the item he purchased.

Here's how it works: First, the bidder and seller agree to the terms of the sale. Second, the bidder submits payment to the escrow service, where the funds are temporarily held. The seller then ships the item to the bidder, and if the bidder is satisfied with the item, he keeps it, and the escrow service releases his funds to the seller. But if he is not satisfied with it, he returns the item and gets his money back from the escrow service. The no-lose appeal of the escrow service is a hot commodity for the savvy auction shopper who is proactive about personal protection.

Customer service. Good customer service can establish a company just as easily as bad customer service can break a company. This is especially true in the sometimes confusing and

What's HOT

- The assurance of adequate security
- Good customer service
- Education about how to get the best deals
- Easy search capabilities

What's NOT

- Reserve auctions with predetermined minimum bid requirements
- Poor customer service
- Lack of search capabilities

What's NEXT

- Strategic alliances or partnerships
- Cross-selling between auction sites to provide one-stop shopping
- Integration with wireless technology

isolated world of online shopping. When people are baffled about a bidding or selling procedure at an auction site, they probably won't continue their transaction until they find an answer to their concern, especially when money is involved.

It's also a fact that naturally skeptical online consumers prefer to ask questions of a real live person rather than writing their queries in an e-mail message to which they may never receive a reply.

That's why BidHit.com recently implemented its extremely popular Live Help feature. It enables customers to "speak" online with a real live customer care representative. The boxLot.com site offers a similar service with their LivePerson Help, which is available during business hours. These interactive, live customer service features are a welcome relief for new users. Even if they can't pick up the phone and hear a person's voice, this instant messaging or chat approach to customer service provides an effective alternative.

Education about online auctions. Today's online consumers want education more than anything, notes Black. They thirst for education about online auctions, and they want to feel that they are getting good deals. At the dawn of the online auction, the shoppers tended to get caught up in the whole bidding process, but today's customers find more satisfaction in education. They're more interested in learning how to make wise choices.

Popular sites such as AuctionWatch.com (<http://www.auctionwatch.com>) provide good starting places for consumers, offering them plenty of tips and tricks, research information, and side-by-side comparisons. AuctionWatch.com is not an auction site, nor is it affiliated with one; its sole purpose is to provide consumer education.

The boxLot.com auction site manages to incorporate a bit of user education into their own environment with the help of its boxLot butler feature. Ring the bell (by clicking it) on the home page to access helpful information.

Easy search capabilities. Amos tells us that the ability to conduct simple and complete searches at an auction site definitely appeals to today's bidders and sellers. Customers at boxLot.com can search for items by keyword, or they can conduct more advanced searches using lot numbers, price ranges, and the seller or user ID.

"This enables people to find what they need faster and with fewer clicks," Amos



BidHit.com exemplifies the business-to-consumer auction model, a type of site where the products sold are either brand new or factory refurbished.

says. People can also quickly access activity reports regarding the items they have up for bid.

Electronic check and credit card processing. Auction sites that follow the format of BidHit.com have typically allowed (or required) bidders to make credit card purchases because the items up for bid are being sold by businesses. But to sites such as boxLot.com that cater to the individual seller, the ability to offer electronic check or credit card processing is just now becoming a popular option.

In fact, Amos explains that boxLot.com just recently launched a new program with E-commerce Exchange, offering members nationwide credit card processing and check payments online. This gives members more financial options, even if they are first-time dealers. As you can imagine, the ability to use credit cards enables bidders to spend more—a prospect that sellers or dealers heartily support.

Charity events. Charities have long used silent auctions as a means of raising both money and awareness for their causes, and now, according to Black, they are beginning to

cooperate with online auction sites to accomplish the same thing. BidHit.com participates by collecting donations of items from sponsor companies, as well as providing the auction site service and donating 100% of the profits to the charity. Online auctions can reach an infinitely larger number of people than the silent auctions of yesterday; hence, the growing popularity of these joint ventures results in good will.

What's Not. The various things we encountered as "not hot" for online auction attendees didn't surprise us at all. Looking at the list below, we think most consumers will agree that these items only hinder the process.

Reserve auctions. For those unfamiliar with the term, reserve auctions are when an item is put up for bid with a predetermined minimum bid requirement. If the bidding never reaches the certain predetermined minimum price, the item never sells.

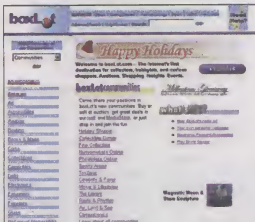
This isn't really fair to the bidders because the person who places the highest bid still can't purchase the item if that bid falls short of the predetermined minimum selling price. Black says a surprisingly large number of auction sites still use this method, but that overall, reserve auctions are on their way out.

Long auctions. We also learned from Black that long auctions, those that extend over a long period of time, are not popular either. It used to be that most auction sites ran their auctions anywhere from one week to one month. Now consumers want the results of their bids much faster, so auction periods typically last only two to three days.

BidHit.com will soon offer five auctions per week, which equates to an extremely fast turnaround. "Faster auctions also keep the consumers coming back frequently to see what's new," says Black.

Sifting and sorting. You can imagine the frustration customers might experience when having to sort through the hundreds of miscellaneous items posted at any given online auction site. They may have a very specific item in mind, but if they have to sift through 300 irrelevant items to locate one good match, they are probably using an online auction site with poor search capabilities, and chances are that they won't stick around long or return once they leave.

Junk and distasteful items. Auction sites that allow inappropriate items, such as someone's body hair, to be placed up for bid most certainly do not qualify as hot in the



The boxLot.com site uses more of a garage-sale approach to auctions, providing a place for individuals to buy and sell personal belongings.

online auction world. "People shouldn't have to sort through things like this while finding what they're after," Amos states. She believes that a site with good security can help eliminate the posting of such odd and inappropriate items.

Bad customer service. "People like the real touch," says Amos. If you can't find help at all on the site, or if the only type of assistance you're given is a vague e-mail address, you probably don't feel very safe at the site. Auction sites that don't even offer a phone number that customers can call for help are certainly not hot.

What's Next. The next step for online auctions involves incorporating several of the same developments that most online businesses seek, including alliances, one-stop shopping, and better marketing techniques.

Strategic alliances or partnerships. Both Black and Amos foresee more future alliances or partnerships between auction companies and other types of companies. Perhaps, says Black, auctions sites will use other companies' products or services to drive more traffic to the auction site, or at the very least, they will use the other companies in advisory capacities.

Amos cites an example of how this is already happening at boxLot.com. She says that it currently has an alliance or partnership

with CheckerBee Publishing in that CheckerBee provides boxLot.com with some of the content that it places on the site. By doing so, boxLot.com's visitors benefit from using CheckerBee's value guide for various collectible items.

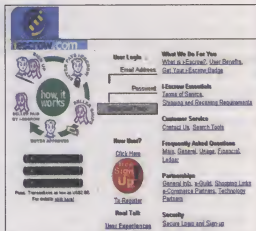
Amos believes that auction bidders and sellers will enjoy the fruits of other such helpful co-operations in the future. The alliances that are now gaining popularity will ultimately help shape the one-stop-shopping marketplace of the future where consumers will have the ability to buy, sell, auction, and obtain information all in one place. In this place of the future, they'll not only buy and sell, but they'll also be able to compare prices and learn more about the merchandise. "Essentially," explains Amos, "this enables us to replicate the bricks-and-mortar world in the clicks world."

Cross-selling between sites. People don't like having to go to different auction sites to bid on different types of items. Although many auction sites already offer a broad range of things, consumers want even more sites with selection. That's why, in the near future, Black and Amos both predict that we will see more cross-selling between different auction sites, or even see the merging of sites. This is yet another step toward the one-stop-shopping model that can easily be accomplished when auction sites come together, sharing their products and their customer bases.

Better marketing. "The marketing of an auction site is as important as the features the site offers," claims Amos. She believes that auction sites will be marketing their sites and products even better in the future, and she also firmly believes that word-of-mouth is one of the most effective (or destructive) forms of marketing. In addition, Amos knows that positive word-of-mouth stems from satisfied customers, so the wise auction site of the future will continue to increase its efforts in the customer service department.

More bartering and exchange models. Consumers can also expect to see a greater variety of ways in which they can purchase items at auction sites, not only through the typical auction method, but also through bartering. A fixed-price model might be on the horizon. Similarly, another future model could be one in which buyers name a price and an item, saying that they will buy the item if the seller will offer it at that price.

Amos wasn't able to specify much yet about the details surrounding these different models,



Security is a hot issue when it comes to online auctions. Consumers making high-dollar transactions should always use an escrow service, such as I-Escrow, to protect themselves against fraud.

but she encourages consumers to keep their eyes open. One small example she did mention was the Main St. Markets for casual shopping at boxLot.com. Under the Main St. Markets section are several links to sites such as Gift Express (<http://www.boxlot.com/mall/directorystores/gift01.html>), where consumers can find items they can buy immediately rather than having to wait through an auction process.

Integration with wireless technology. Black looks forward to the not-so-distant day when Web applications, such as online auction sites, will integrate with common wireless technologies. As if the Internet itself isn't enough of a convenient and immediate source of information, tomorrow's bidders and sellers will be able to access auction sites through their cellular phones or handheld devices, no matter where they are. This next big technological step will ultimately bring e-commerce to consumers anytime, anywhere.

What's Now. If learning what's hot, what's not, and what's next in the online auction world teaches us one thing, it's that online auctions aren't disappearing any time soon. They're guaranteed to continue changing and evolving, looking more different tomorrow than they did today, but they're not likely to utterly fail. E-commerce as a whole gains momentum daily, and online auctions constitute a popular segment of that market, showing signs that their presence is hot and their future is bright. **LS**

by Hannah Henry

Terms To Know

e-commerce—Electronic commerce is the practice of buying and selling goods via the Internet.

escrow service—A service that helps consumers protect themselves from fraudulent online activity. When a bidder pays for an item, he or she submits the payment to the escrow service until the item is shipped, received, and approved by the bidder. When the bidder decides to keep the item, the escrow service then releases the payment to the seller.

keyword—When using a search function, a keyword is the word the user wants to find in a document or documents.

reserve auctions—A type of auction in which the seller predetermines a minimum selling price for the item. If the highest bid is still below the reserve price, the item doesn't sell.

Portals & Vortals

The Launching Pads For Your Web Travels



portals, also called vortals. Unlike portals, vortals target specific markets. Pharmaceutical Online (<http://www.pharmaceuticalonline.com>), for example, is targeted at pharmacists, and Bakery Online (<http://www.bakeryonline.com>) is aimed at bakers. Vortals are hot.

"I think vortals are hot because the Internet is all about intimacy and one-to-one marketing," says Mike Hagan, co-founder and executive vice president at VerticalNet (<http://www.vertical.net>), a company that specializes in vortal develop-

ment. "The vertical guys can do a much better job than the horizontal mass-media guys at providing very rich, targeted, relevant content to a group of similar professionals, special interest groups, and consumer niches."

The typical vortal offers relevant news headlines, industry event calendars, links to related sites, and lists of vendors and businesses that offer pertinent products and services. Few vortals provide the Web-based applications, such as free e-mail and online address books, associated with portals.

Communication features. Despite the array of information available on the Web, it's still the communication features of portals that remain the most popular. In response to consumer demand, portal developers have expanded their messaging options. Many portals now offer free faxing service, automatic response functions, free voice mail, mail forwarding,

e-mail reminders, address blocking services, electronic greeting cards, and other features that enhance the user's ability to send and receive messages online.

E-commerce and finance. "Another area that continues to be warm is in the commerce arena," says Joe Kraus, senior vice president of content and co-founder of Excite (<http://www.excite.com>), one of the Web's most popular portals. "Typically, people are searching for where and what to buy. Obviously, we don't sell anything on the site. But certainly, especially in the holiday season, we see tremendous usage of those types of features. It's product-research functionality."

Many portals offer valuable Web-based shopping assistance. At Excite, for example, you can get the universal resource locators (URLs) of reputable online retailers, post and search classified ads, enter bids at online auctions, and download money-saving coupons.

Equally hot at portals are the financial services available to registered users. At many portals, you can set up an online portfolio to get continuously updated stock quotes. You can review charts that profile a stock or mutual fund's performance over the past several months and years. You can look up stock symbols and read the latest financial headlines, too.

Personalizing content. Personalization is a big feature throughout the computer industry, and it's equally hot at portals. "Making the service more and more unique to every individual and allowing them to control increasing amounts of their entire experience is very hot," Kraus says. "Anything from changing their color to changing their stocks to changing the way their page is displayed."

It's appropriate that personalization is a hot feature, considering that portals were originally developed to make the Web easier to use. By customizing the way content appears on-screen as well as how you access that content, you improve your online productivity and efficiency.

What's Not. The demand for more, more, more seems to be the guiding principle

The portal was born in 1997 when several Internet search engines and Web directories added free e-mail accounts, stock quotes, news headlines, and several other Web-based services to their sites in hopes of becoming major jumping-off points for Web surfers. Since then, the portal has flourished. Today, users have more choices than ever when it comes to selecting a jumping-off point they can call their own.

What's Hot. Because of their broad appeal, portals provide an accurate gauge of where the Internet is going. Consequently, if you want to know what to expect from the Internet in the future, pay special attention to what's hot in portals right now.

Creating vortals. In addition to the traditional portals, which are aimed at the average user, the Web is home to hundreds of vertical

What's HOT

- Vortals targeted at specific markets
- Communication features of portals
- Assistance with e-commerce and finance
- Personalizing content

What's NOT

- Chat usage
- Misdirected vortals
- Content that slows down users

What's NEXT

- Server-based applications
- Vortals incorporating general content
- Universal access for alternative devices
- Becoming all-purpose messaging centers

in the development of portals. This has led to many useful online innovations, including free faxing and voice messaging services, for which we are all thankful. Unfortunately, not everything offered at portals has enjoyed success.

Chat usage. From a personal perspective, chat may be a wonderful thing. But when it comes to productivity, chat gets a big thumbs-down. "Obviously chat works when you're at home and you're on America Online," says Hagan of VerticalNet. "But if you're working for DuPont and your boss sees you in a chat room during the day, he's immediately going to be skeptical about whether that makes you a more productive employee. . . . [On a vortal, chat is] not the killer app that it is inside an America Online connection."

The problems associated with chat are numerous. For one thing, most chat rooms have several conversations going at once. It's virtually impossible to carry on a serious discussion when you have to deal with all the meaningless babble going on around you. Another problem is that public chat rooms offer no privacy. And private instant messaging, when it's conducted across the Internet, is hardly secure.

Perhaps the biggest problem with chat, however, is that it's just so insular. "It's limited in its audience," Kraus says, "although it's highly used by that audience. It's certainly an area we have to make sure we promote. To broaden the audience, we have to work on improving the relevance of chat."

Misdirected vortals. If vortals are hot, misdirected vortals are not. A misdirected vortal is one that has tried to appeal to the wrong audience or one that has failed to pinpoint a specific industry or interest.

A quality vortal, says Hagan, offers "deep content, all relevant to that industry. It would have to narrowly define the audience that it's targeted. I wouldn't look at a vortal portal that would go after all manufacturing professionals. It would have to target people who manufacture chemicals or manufacture pharmaceuticals or manufacture design chips."

VerticalNet and About.com (<http://www.about.com>) are two companies that have proved successful at developing vortals. Both companies are very specific about the audiences they target. VerticalNet aims its vortals at niches in the professional business-to-business markets, including plant automation (<http://www.plantautomation.com>) and surface finishing (<http://www.surfacefinishing.com>). About.com provides vortals that are geared toward the consumer market. Some of its offerings include the

Christian music vortal (<http://christianmusic.about.com>) and the diabetes vortal (<http://diabetes.about.com>).

Slow hits. A successful portal is not a stopping-off point. Portal developers need to keep this in mind. Content and services that make users slow down are just not very hot.

"For a long while, we had a product called Excite Tours," says Kraus of Excite. "These were basically tutorials on how to get the most out of the Web in a particular area, and they were a paragraph that had relevant links. We haven't had it for awhile. That's an example of the types of things that aren't all that hot. Anything that's not quick-hit information."

What's Next. The future of portals should include increased convenience, universal access to data, and redefined content.

Server-based applications. Expect to see more server-based applications, such as free e-mail or data storage, provided by your favorite portal. Server-based applications are already a favorite among most portal users. Unfortunately, the narrow bandwidth that's characteristic of most Internet connections currently limits developers from offering as many services and as much content as they would like. As bandwidth increases, these limitations will disappear.


Vortal generalities. "I think that the vortal portals are also going to end up going out and getting mass consumer content," Hagan predicts. "General news. General sports. I think you'll see some of the vortal portals provide a lot of the sticky applications, such as free e-mail, such as calendaring. Some of the sticky applications work as well or better inside a vertical destination site as they do in the mass consumer sites."

That's true. Having an e-mail address at Yahoo.com doesn't tell other people anything about you. But an e-mail address at HomeHealthProvider.com serves as an identifying badge. A vortal calendar service could provide additional convenience by including automatic reminders for the dates that are important to people who share your common interest. Similarly, by incorporating general information, such as national news headlines, the vortal developer allows you to get the information that's important to you without leaving the site.

Universal access. The expected proliferation of wireless devices and Internet-access appliances will have an effect on the future of portals. Portals will have to design their content and services, including e-mail, calendars, address books, and stock quotes, in such a way

that alternative devices, many of which are not capable of supporting graphics, can access them.

Integrated messaging. Portals may evolve into all-purpose messaging centers, Kraus predicts, where you go to retrieve your e-mail messages, faxes, pager messages, and voice mail messages. Additionally, an integrated messaging center could synchronize your address book and calendar with your messaging components. Given the Internet's popularity as a communications tool, it would not be surprising if it eventually became your only communications tool.

What's Now. The only way to capitalize on a portal's hot capabilities is to find one you like and register with it. By registering, you'll get a free e-mail account, a free Web page, personalized news headlines, and much more. More importantly, you'll be poised to take advantage of whatever comes next for portals. 

by Jeff Dodd

Terms To Know

bandwidth—The capacity of a network to carry data.

chat—Real-time, text-based communication over a network. Chat rooms are open to anybody, but most participants are regular users.

e-commerce—Internet-based commercial activity, particularly the buying and selling of goods on the World Wide Web.

server—On a network, this is a computer that controls access to software, data, printers, and other parts of the network. A Web server, for example, controls access to Web sites and Web-based applications.

sticky application—A feature or service that attracts and keeps visitors at a particular Web site. Free e-mail is a sticky application because it prompts users to frequently visit its source site.

universal resource locator (URL)—An Internet address used to locate a Web site. For example, the URL for the Smart Computing Web site is <http://www.smartcomputing.com>.

Search Tools

Combining Software & Human Editors To Produce Better Query Results



searches that are more concise; some are bundling features, and others are relying on databases from more than one search site for a single search. Some search sites, however, are evolving in ways that may jeopardize the user's searches. For example, many of them are focusing too heavily on winning advertisers.

As search site trends come and go, search site selection should boil down to personal preference. Danny Sullivan, editor of *searchenginewatch.com* (<http://www.searchenginewatch.com>), an industry

online newsletter, says, "Think of it like shoes: If you go dancing, you're going to put on one pair of shoes, and if you go hiking, you'll put on another kind of shoe. Search engines are just like that. If you're doing a particular kind of query, you may feel one search engine is better for that. So, people should feel completely comfortable strapping on different kinds of search engines depending on their needs."

■ **What's Hot.** Even though the Web can overwhelm a user by its vast size, so can the growing number of search sites that are supposed to help make the Web manageable. Presently, about 30 U.S. search sites have a significant presence on the Web. In 1995, only about half a dozen U.S. search sites had a significant presence, Sullivan says. The best sites managed to stand out in this competitive

environment by changing their search technology. Most of this new technology allows sites to offer users more diverse content for their queries. Sites have also continued to improve search results.

Combining functions. Among the biggest trends in search sites, Sullivan says, is that many search sites—traditionally either a directory or crawler-powered—are combining both functions. In the past, traditional directory search sites, such as Yahoo! (<http://www.yahoo.com>) and LookSmart (<http://www.looksmart.com>), had only editors who created their listings. For these directories, Web developers subject their included sites to the opinions of directory's editors. The editors categorize the Web sites in an index: When a user conducts a search, the index/directory searches for Web sites that match the descriptions the user submitted in the query.

Traditional crawler-powered search engines, such as HotBot (<http://www.hotbot.com>) and Excite (<http://www.excite.com>), ran on special software that crawls the Web to look for content. With these search engines, the content must match the criteria of the software for the crawler to add the site to the search engine's database. When a user conducts a search, these sites determine relevance by analyzing the position or number of words (or other variables) on a matching page.

Now, many of the traditional directory and crawler search sites are using both functions to provide better search results for more types of searches. For instance, AltaVista (<http://www.altavista.com>) and Lycos (<http://www.lycos.com>), which historically depended on crawler-powered searches, are now also using directories. Yahoo! now retrieves results based on crawlers, too.

Metasearches. More and more search sites are querying other search engines to conduct searches James says. These search sites, also known as metasearch engines, are useful for conducting specific searches.

What's HOT

- Crawler-powered technology combined with directories
- Search sites becoming portals
- Reliable results or unique technologies

What's NOT

- Focusing on winning advertisers
- Too rashly adding crawler technology to directories
- Employing one type of search technology

What's NEXT

- More user-friendly searches
- Content centered on a theme or subject
- Posting results at the top of lists based on the amount of money advertisers pay

Consider one such search site, MetaCrawler (http://www.metacrawler.com), which may send the user's query to several other search engines, including Yahoo!, Lycos, WebCrawler, Excite and LookSmart. When MetaCrawler receives a query, it transforms it to the syntax used in each of the supported search engines and then simultaneously listens for responses from them. When all the supported search engines return the responses, or when it reaches its set time-out period, MetaCrawler collates responses, removes duplicates, ranks them, and returns the results to the user.

Portals. Another trend in search sites is consolidating external features to attract users or divert them to partner Web sites. Many sites are no longer places people visit merely to conduct a search then pursue a link. Instead, a growing number of search sites have evolved into portals of the Internet, becoming centers where people will spend some time. These portals, such as Yahoo!, are search sites with "sticky" features, such as free e-mail, chat rooms, shopping, and news. Portal Web sites include Excite, the GO Network (http://www.go.com), MSN (http://www.msn.com), Lycos, and AltaVista.

New technology and old favorites. Despite these trends, the traditional, big-name search sites are still among the most reliable. Yahoo!, for instance, consistently tops rating lists by New York-based Media Matrix's (http://www.mediamatrix.com) Internet measurement service. Because Yahoo!'s editors index listings, which are organized by subject, users generally get results more quickly, Janes says.

This is not to say you should rule out lesser-known search sites. Some of the smaller search engines have developed unique technologies that get them noticed. In fact, this was the case with Google (http://www.google.com), which started out as a small Stanford University research project. The search site spread by word of mouth to become one of the hottest search sites today, doing about 3.5 million searches daily. Google uses what it calls PageRank technology, which performs an objective measurement of the

importance of Web pages, depending on a mathematical formula. Google delivers results in terms of relevance and importance.

■ **What's Not.** Even though search site selection depends primarily on personal

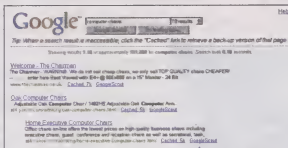
preference, the fact remains that some sites are better than others. Some cater to their advertisers at the users' expense; some are less powerful and efficient.

Winning advertisers. In the increasingly competitive environment among search sites, some are focusing too much on winning advertisers, Janes says. This can get in the way of ensuring that users get the most pertinent information, and search sites that do this run the danger of providing useless information by focusing on getting an advertiser's name out.

Janes points to the new search site, iWon (http://www.iwon.com), as an example. Launched in October 1999, the search site gives away \$1 million each month to a user who registers with the site. After the user registers, he or she will collect entries by clicking links with red numbers and a prompt (>) to the left of the link. For instance, clicking a link with "5>" to the left of the link will give the user five entries toward daily, monthly, and annual sweepstakes. This search site focuses too much on getting users to click advertisers' Web sites, Janes says. "I'm skeptical ... they're getting paid by other people through advertising or because they're driving site traffic to other sites, and those people will be paid by other advertisers for their site traffic."

Directory don'ts. In addition, some search sites that were once strong, crawler-powered sites are jumping too quickly at the trend of adding directories. In fact, combining both crawler and directory functions too rashly may result in the search site becoming less effective.

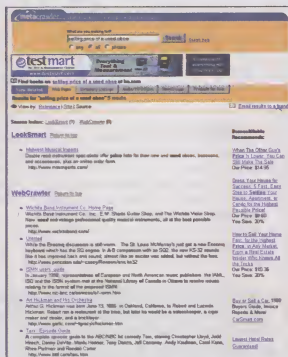
This was the case for the GO Network, which ranks at the bottom among more than two dozen Web search tools analyzed by SearchIQ (http://www.searchiq.com), an online provider of independent reviews and rankings of search tools. SearchIQ gave GO a low ranking based on such criteria as its overall relevancy of results; its ability to find relevant links for broad topics, specific topics, and corporate sites; and its comprehensive listings. In fact, GO fell in the category of "mentally impaired," also known as



The Google search site started as a small research project; it has emerged as one of the hottest search sites on the Web.



Yahoo!, a search directory, is considered among those search sites most likely to produce relevant results because editors index the sites it lists.



MetaCrawler is a metasearch engine that queries other search sites for better search results.



My Yahoo!, a personalized Web page that provides automatic content according to the user's preference, offers a snapshot of how search sites will evolve.

below average, according to SearchIQ's analysis. This low ranking is partly because GO segments its database so only its reviewed sites are included in the directory. So, depending on the keyword search, GO's top recommendations may push the Web pages down too low for most viewers to see them. The search site rejects sites it doesn't like, and it decides for the viewer what sites to select.

On the other hand, some sites that remain crawler-powered sites may provide less useful results because of the narrow criteria on which they base searches. Lycos, ranked second to last in SearchIQ's analysis because (as a result of its crawler-powered technology) often tops its results listings with the Web pages that have the least useful content. Lycos uses an algorithm that favors minimal page size and content and the particular placement of keywords. As a result, the search site, even though it is the fourth most frequently visited search engine or directory, ranked at a level that SearchIQ says "ordinarily can obtain licenses to drive, can succeed at 71% of all jobs." (This means Lycos is a below-average search site in terms of its results.)

What's Next. In the future, expect search sites to get more personal, stickier, user-friendlier, and more focused on winning advertisers.

Getting personal. For one, search sites will use demographic data, most likely collected from online user surveys, to direct users to sites they think they will be most interested in, Sullivan says. For an idea of how this will work, check out search sites such as Yahoo!, Lycos, GO, and Excite; they let users sign up for such perks as a personalized home page, accounts for e-commerce purchases, and e-mail. By filling in a search

site's online form, which asks for personal information, a login name, and a password, the user can personalize the site. The search site remembers the user by storing a cookie (an identifying file) on the user's computer so it can present the user with Web pages that match the user's preferences for such content as news and weather.

Consolidation. More search sites will also consolidating

features to encourage users to stay at their sites and to search advertising partners' links. Even though AltaVista recently did this by turning itself into a portal, existing portals are likely to become even stickier by precisely targeting visitors and offering more features. These sites will most likely offer content packaged around a single theme and provide even more information and entertainment to encourage visitors to stay, Jones says.

Better listings? More search sites will also use the Yellow Pages model: one in which a listing is closer to the top of the results list

when that advertiser pays more money to the search service. Such a model, used now by GoTo (<http://www.goto.com>), is a simple, lucrative approach that will become more common in the future, according to eMarketer. This approach, however, may hurt search site users.

Most importantly, search engines will become more responsive to users' queries. More sites will strengthen functions with such elements as natural-language searching (used now by such search engines as Ask Jeeves [<http://www.askjeeves.com>]) and by combining search engines for queries.

New sites. The good news is that additional search sites will emerge to offer users more range in their queries. In fact, even with the consolidation of search site companies, look for more options in the future. "Every year, we pick up one to three (new search) services worth considering," Sullivan says. "We still will have new players come up for the next few years." □

by Michelle Wirth Fellman

Terms To Know

cookie—Information from a Web site sent to a browser and stored on a user's hard drive so the Web site can retrieve it later. A Web server using the technology looks for a cookie when a user visits. Cookies are generally used to identify visitors. A cookie can contain information about the user's login name, password, and preferences. For subscription sites, the cookie can make it unnecessary to log in each time. Users have the option to configure their browsers to either accept or reject cookies.

crawler/search engine site—A site that uses special software that "crawls" the Web to look for content. If the content matches the

criteria of the software, the software adds the site to the search engine's database. When a user conducts a search, the search engine determines the relevance of hits by certain criteria, such as the number of matching words on a page. These sites work best for specific searches, such as those for a company name or person.

directory site—A site that has editors who create its site listings. Web developers subject their search sites to the opinions of the directory's editors instead of using a program. The editors categorize the Web sites in an index. When a user conducts a search, the directory searches the index and looks for sites that meet

the specifications of the query. These sites are useful for general searches for broad topics.

metasearch site—A site that queries other search engines and/or directories to conduct a search. These sites are useful for users doing specific searches.

portal—A Web site that serves as a window to the rest of the Web. Its purpose is to guide surfers to just about anything they want to find online and provide as many services as possible in one place, such as free E-mail accounts, stock listings, and personalized news. Yahoo! and Excite are good examples of portals.

Investment Sites

The Government Steps Up To Protect Traders



and businesses, including online brokerages, media outlets, con artists, and analysts, are vying for your eyes and dollars. Knowing the market is important, but the first step is knowing the good, the bad, and the just-around-the-corner when it comes to Internet investment Web sites.

■ What's Hot.

The biggest trend right now in investment sites is user-friendliness. Every site is trying to cater

It's one of the fastest growing segments of the Internet, and it has nothing to do with people taking their clothes off; although, many find wearing a bathrobe while doing it enhances the experience. It is investing, and the phenomenal growth in the U.S. financial markets and the Internet over the past couple of years has inspired many people to use the Internet to obtain investment information. It's a convenient and cost-effective way to research, track, buy, and sell stocks, as well as keep abreast of changes in other investment fields.

At the close of 1999, experts estimated that one out of six investors were doing their business online, and that number is expected to swell to one in four this year. With that much interest, it's no wonder that so many people

to specific users. Some are specializing in certain areas; others are focusing their attention on new users.

Investing on the Internet. You really have to give the biggest nod to the phenomenon itself. The Internet is rapidly revolutionizing investing, and five years from now, the relationship between consumers and markets will look nothing like the relationship today. Where before investors were more likely to go through stockbrokers, now they are more likely to go online and execute trades themselves.

The advantages of online trading are many:

- Trades are generally less expensive.
- You can access your account any time from anywhere
- Research is not only easy to find, but it is also usually free and of high quality

- Keeping up with the markets is much easier to do on a computer than trying to track down stock quotes via phone.

A recent survey by J.D. Powers and Associates showed the Internet is the fourth most popular source of financial information (behind newspapers, television, and investment magazines), and sites dedicated to financial pursuits abound. General, all-in-one sites, such as The Motley Fool (<http://www.fool.com>), Bloomberg.com (<http://www.bloomberg.com>), and SmartMoney.com (<http://www.smartmoney.com>), now offer a stunning selection of features, news, and other information. If you're just looking for news, every major media outlet and Internet portal hosts its own financial channels. For example, you can peruse Excite News (<http://news.excite.com>) and Yahoo! Finance (<http://finance.yahoo.com/?u>). Business search engines, such as justquotes.com (<http://www.justquotes.com>) and TradingDay.com (<http://www.tradingday.com>), let you look up stock quotes, news, and analysis recommendations; sites such as Hoovers Online (<http://www.hoovers.com>) and Kompass International (for foreign companies; <http://www.kompass.com>) let you pry deeply into the workings of companies to get ownership, executive, and other company information.

Investment clubs. Even though they've been around for many years, investment clubs have risen in popularity during the past few years. This is due in part to the popularity of groups such as the Beardstown Ladies Investment Club. Clubs are run in different ways, but they all have the same general theme: A group of investors who pool their money to make joint investments. These clubs offer several advantages over individually investing, including shared knowledge, diversification, and reduced transaction costs.

There are now thousands of such clubs in existence, and the Internet has made it easy to find one that will work for you. Try the Wild Capital Investment Clubs List Web site (<http://www.computerland.net/~missouri/>)

What's HOT

- Investing on the Internet
- Investment clubs
- Stock market games

What's NOT

- Growing pains
- Scam artists
- Subscriptions

What's NEXT

- Better service
- Electronic communications networks (ECNs)
- Increased regulation

investment_club.htm) to find clubs by state or country. If you're looking for general information, sites such as The Motley Fool have investment club sections (<http://www.fool.com/InvestmentClub/InvestmentClub.htm>). The new bivio Web site (<http://www.bivio.com>) makes it easy to find out how investment clubs work and how to set up and manage your own. Finally, check out the National Association of Investors (<http://www.better-investing.org>); this organization has been helping people run successful clubs for almost 50 years.

Sites for new users. The stock market goes through the roof, IPOs climb 600% in a day, online brokers such as Ameritrade (<http://www.ameritrade.com>) and E*TRADE (<http://www.etrade.com>) litter the media with ads... you're starting to feel a little like Cinderella, left at home while everyone else is partying down. The push is on by online brokers to get your business, and even though it might be tempting to leap in and worry about swimming later, a little doggie paddling goes a long way in the investment pool.

Many sites gear themselves primarily toward new users, and some of the best include:

- **MoneyCentral Investor** (<http://moneycentral.msn.com/investor/home.asp>): This wing of the Microsoft Network offers great reference materials and step-by-step guides. Just click the Insight link to start.
- **Investing Online Resource Center** (<http://www.investingonline.org>): Created by the securities division of the Washington State Department of Financial Institutions, this non-profit site exposes myths and helps you get to the real costs and rules involved in online investing. It also features a quiz to see if you're ready to trade, as well as other resources.
- **Investor Education and Assistance** (<http://www.sec.gov/oea1.htm>): From the U.S. Securities and Exchange Commission, this site is dedicated to education, assistance, and complaints by and about investors.
- **National Association of Securities Dealers** (<http://www.nasdr.com>): A great site to get information on brokers, as well as complain about them.
- **Gomez Advisors** (http://www.gomez.com/channels/index.cfm?topcat_id=3): Its Internet Broker Scorecard compares many of the top online brokers according to various categories.

(NOTE: If you find yourself stuck on a term or two along the way, try the Washingtonpost.com online business glossary at <http://cgi.washingtonpost.com/wp-srv/business/longterm/glossary/glossary.htm>.)

Stock market games. One of the best things a new investor can do is to play one of the many fantasy stock market games found on the Internet. Games such as Virtual Stock Exchange and the E*TRADE Game let users buy and sell

months ago, can still crop up at any time, locking users out or keeping them from making crucial trades. In addition, many sites still don't handle your transactions in real-time, meaning it could be hours before your trade goes through. Also, support at some brokers can be iffy at best, non-existent at worse. This can not only lead to exasperation when you have problems but also the feeling that you're trading in the middle of the desert, a by-the-seat-of-your-pants approach that may not appeal to all investors. On the bright side, expect customer service to improve considerably across the spectrum as brokerages key into the fact that users consistently rate service before cost in terms of importance.

Fraud and security problems. If you've spent any time on the Internet, no one has to tell you that surfing with the caution flag out is part of standard operating procedure. Security on reputable sites (particularly brokers) is effective and usually relies on three methods to protect your information and money: PIN/account numbers, encryption, and authorization (no one can access your money but you). As long as you're on a reputable site, you should have no problems in this area.

But there are always con artists operating at the fringe, and one recent con, called the micro-cap fraud, serves as an example of how some of these scams work. Micro-caps are small company stocks, ones that sell for little money and aren't listed on the major markets. Con artists buy a sizeable amount of a given stock and then start hitting chat rooms and bulletin boards to spread disinformation about the stock. Everyone sees it as the next Microsoft and buys into the stock, which sends its price soaring, briefly. The bad guys sell out, the stock crashes, and everyone else loses their shirts.

Beware of deals (and stocks) that sound too good, especially if you're not sure if the source (person or site) is legitimate. The Federal Trade Commission (FTC) Consumer Protection Site (<http://www.ftc.gov/ftc/consumer.htm>) offers information on investment and Internet frauds.

Questionable tactics. Late last year, two reports were released that called into question many of the practices, tactics, and even the underlying philosophies of some online brokerages. Citing what he called an "expectation gap" between what users expect and what they get, New York State Attorney General Eliot Spitzer launched an investigation into brokerage practices following a series of technical problems that crippled E*TRADE for several days in



Investment clubs are a great way to start online trading. Start at the bivio Web site to find out how investment clubs work and how to set up and manage your own club.

stocks and options with play money. This is a perfect no-risk way to acquaint yourself with the world of investing. Most games run for a specific length of time (usually monthly), and many offer cash prizes for those who've made the biggest killing. You can find a list of games at G6 Perspective (<http://www.g6perspective.com/lbgames.htm>).

Specialization. Another hot trend, according to Eli Neusner, senior analyst and community manager for MetaMarkets.com (<http://www.metamarkets.com>), is in sites that focus on specific industries or areas such as IPOs, earnings, or charting. "With money at stake, investors trust the specialist over the generalist," Neusner says. IPO.com at <http://www.ipoc.com>, for example, is devoted to IPOs.

■ What's Not. When signing up with an online investment site, you need to make sure you aren't taken. For example, sometimes sites will take questionable actions or charge you a subscription fee when you can get the same information for free on another site. You also need to be aware of the problems that growing pains, security, and fraud can cause investment sites.

Growing pains. Even though it has come far in the past couple of years, investing through online brokers is still hit or miss. Computer/tech problems, though much rarer than just a few

February 1999. Spitzer and his team raised questions about misleading advertising, the brokerage's degree of willingness to disclose information regarding system failures, and more.

The second report came from U.S. Securities and Exchange Commission's (SEC's) Commissioner Laura Unger, and it too looked at numerous issues, including whether brokerages should be sponsoring stock discussions in chat rooms and even whether online trading was suitable for all traders. At issue is whether online brokers, because they provide targeted information to users based on their account balances, trading activity, etc., have an obligation not to recommend investments they know are not suitable for given clients.

The SEC is also planning to examine issues such as fees for instant stock quotes, privacy policies, and again, the issue of how brokerages should disclose contingency plans. Even though this will mean better functionality for future users, the investigation of some of these issues may raise red flags for some investors.

Subscriptions. There are so many sites offering great research and other free information that you should make sure anyone who is looking to charge you subscription rates is offering something unique and worth your money. As the trend is toward increased quality of free information on sites, this becomes even more of an issue.

■ **What's Next.** In the future, the customer will win big. Sites are trying to gain and retain customers with new features and easier navigation. The government is trying to protect traders from themselves and from companies with increased regulation.

The customer comes first. Competition generally favors the customer, and there is enough in the area of online investing (despite

the fact that the field is consolidating at a fast pace) to ensure that private investors will have a lot to look forward to in the future.

"Investment Web sites will have to provide more advanced tools as users gain in sophistication, but the winners will be those sites that provide easy navigation and quality content (news, chat, research)," says David Wachtel, publisher of Bloomberg Media. "Of equal importance will be the ability to provide content of all types in an on-demand format."

Users can also expect service to evolve well beyond the point it's at now. The 1999 Dow Jones Newswires Investor Satisfaction Study by J.D. Powers and Associates decried the absence of the human touch in online trading, stating without equivocation that satisfaction and the ability to communicate with an actual person went hand in hand. This, and the presence of usable research/educational information, is going to serve brokerages much more effectively than having the lowest trading cost on the block.

Extended trading and ECNs. Even though major exchanges have been holding back on this, expect movement in the direction of extended trading this year as Amex, NASDAQ, and the New York Stock Exchange face increasing competition from electronic stock exchanges and electronic communications networks (ECNs). ECNs are computerized trading networks that allow traders to buy and sell stock without a market-maker. (See the "Terms To Know" sidebar.) Two of these, Archipelago (<http://www.tradearca.com>) and Island (<http://www.isld.com>), have applied to become stock exchanges themselves.

Increased regulation. Based on the results of reports such as the aforementioned ones from the New York State Attorney General and SEC Commissioner, expect to see an increase in consumer protections in the area of online investing. The New York Attorney General has already called for an immediate release of four sets of broker statistics that include outages, system capacity, trade execution, and customer service.

The community model. Aram Fuchs, CEO of FertileMind (<http://www.fertilemind.net>), sees the emergence of the "community model" as a future trend. "I think financial content sites will advance by fully developing the community model," Fuchs says. "In general, they will do this not by any 'gee whiz' technology, but by integrating their in-house journalists and analysts into the community itself. There will be less of a

Terms To Know

authorization—For online brokerages, authorization often refers to the written OK a broker requires from you in order to release funds.

contingency plans—An online brokerage's plan of action in the event of technical or other service problems; it's designed to minimize losses and/or restore usability in the event of any system problems.

electronic communications network (ECN)—A computerized trading network that allows for the trading of stocks outside of conventional exchanges and markets such as the New York Stock Exchange or NASDAQ.

initial public offering (IPO)—A company's first sale of stock to the public.

market-maker—A brokerage or bank that is willing to accept the risk of holding a security to facilitate trading in that security.

micro-cap fraud—A scam where con artists spread disinformation about small stocks they own in order to drive the price up.

suitability—Also known as Rule 405 or "know your customer." The premise that brokers are responsible for determining whether recommendations they make are suitable for given customers.

distinction between articles and message boards. The journalists and analysts will serve as catalysts and focal points for the conversations and discussions going on at the site."

Integration with software. Late last year, E*TRADE and Microsoft entered into an agreement that would bundle E*TRADE headlines and financial links in several areas of Microsoft's Money 2000 application. Interestingly enough, Money 2000 will also come with an E*TRADE membership application in the box. Expect more of this online/desktop software integration in the future. [E]

by Rich Gray

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Volatility Information
How can you get the most up-to-date information on the market? Use our Volatility Information. (See our website for more information.)

Investment FUND
How can you get the most up-to-date information on the market? Use our Investment FUND. (See our website for more information.)

In the future, expect to see more competition for Amex, NASDAQ, and the New York Stock Exchange from electronic stock exchanges and electronic communications networks, such as Island.

Banking Sites

More Options & Lower Fees
Make Online Banks Attractive



It is hard to believe it was only 10 years ago that the first online bank opened its virtual doors. The online banking pioneer was none other than Wells Fargo (<http://wellsfargo.com/home>), which initially offered online banking through Prodigy. At first, as a Wells Fargo's online banking customer, you could only check your balances and transfer funds between accounts. By 1995, you could also review transactions in the last 45 days.

What's Hot. Today, you can do almost any banking service online that you can do in person at a traditional, physical bank. You can choose from any of thousands of online banks whose brick-and-mortar locations may be anywhere in the world, or nowhere in the world.

That is, you can even do business with a virtual bank, one that has no brick-and-mortar counterpart. In fact, virtual banking is one of the hottest new trends in online banking sites.

If you are not sure whether you are ready for online banking, consider whether it will actually save you any time or money. If you currently are using the Internet for searches or purchases, then

you do not have the hassle of going out and buying a computer and modem, signing up for an Internet service provider, and then learning to use all of them. If you are familiar with or already use some form of money management software, then your learning curve is again shortened. And if you have more than 10 or so bills to pay each month, then you are a very good candidate for online banking.

So what is online banking? A true online bank is one that lets you do all or most of the basic banking activities online, using a personal computer and an Internet connection. An online bank should let you:

- Check balances in your accounts
- Transfer funds between your accounts

- Review a history of your transactions
- Communicate with your banking representative via e-mail
- Pay bills online
- Learn about interest rates, loans, services, and other products offered by your financial institution

Most brick-and-mortar banks now offer some form of online banking. Even if your bank does not yet offer full online service, making use of what online services your bank does offer is a good way to find out whether you like online banking.

Or maybe you are ready to jump right into online banking, and you aren't even sure you want to stay with your local physical bank. If that is the case, you have a World Wide Web of choices awaiting you.

When looking for the online bank you want to use, you'll have the choice of using the online services of a physical bank or using an Internet-only, or virtual, bank.

Just as there are virtual stores that do not have a physical presence, such as Amazon.com, there are also virtual banks that exist only on the Internet. Virtual banks are just as secure as physical banks, but they do not have the overhead expense of maintaining a building and paying tellers. Therefore, they usually are able to offer lower fees and more free services, such as free online bill paying and free checking.

With an Internet-only bank, you have the added convenience of not having to change banks if you move or change jobs and not having to track down a branch of your bank in another city if you travel a lot. And, of course, there is the convenience of having 24-hour, seven-days-a-week Internet access to your account. Net.B@nk (<http://www.netbank.com>), established in October 1996, was the first virtual bank and remains the largest today. CompuBank (<http://www.compubank.com>), established only a year later, has become very popular and was, in fact, ranked as the No. 1 Online Bank by *SmartMoney Magazine* in June 1999.

What's HOT

- Online bill paying
- Internet-only banks and credit cards
- Comparison shopping for interest rates, loans, and banking services

What's NOT

- Third-party software for online banking
- Fees for basic online banking services
- Security and privacy issues

What's NEXT

- More virtual banks
- Lower or disappearing ATM fees
- More competitive services and interest rates

Online Banking Report's 100 Largest Web Banks

Visit the virtual headquarters of America's largest financial institutions. The list has not been adjusted for subsequent mergers unless stated otherwise. Total assets are accurate as of December 31, 1998 and are listed in US dollars (\$Bn).

Rank	Bank	Headquarters	Total Web Assets (\$Bn)
1	Chase	New York, NY	621.4
2	Bank of America	Charlotte, NC	617.6
3	Citibank	New York, NY	369.8
4	Bank One	Columbus, OH	261.4
5	TD Ameritrade	New York, NY	261.0
6	Bank of New York	Charlotte, NC	227.7
7	Wells Fargo	San Francisco, CA	202.4
8	Washington Mutual	Seattle, WA	165.4
9	Bankers Trust	New York, NY	133.1
10	First Interstate	Los Angeles, CA	104.3
11	Bank of the Americas	Atlanta, GA	93.1

The Online Banking Report's list of the 100 Largest Web Banks ranks banks in order of size by assets and gives you hyperlinks to each.

Since Net.B@nk and CompuBank opened their virtual doors, many other Internet-only banks have joined them on the Internet. You'll see many of them listed, often with comments, on the Investor Guide web page at <http://www.investorguide.com/Banking.htm#BestBanks>.

There are a couple of drawbacks to using a virtual bank, however. For example, because there is no physical bank to which you can go to make a deposit, you'll have to either mail in your deposits or use direct deposit. Of course, if you already use direct deposit, that won't be a drawback for you at all.

Then there is the matter of non-existent ATMs. Because virtual banks do not maintain their own physical ATMs, you may end up paying ATM fees when you use your ATM card to withdraw cash. To help defray this cost, some Internet-only banks offer ATM fee rebates up to a certain amount. If you frequently use your ATM card to withdraw cash, that's something you'll need to check when you choose a virtual bank.

If you aren't quite ready for online banking with a virtual bank, you might want to start out with just an Internet-only credit card. Almost all virtual banks offer them, and most will let you apply for a credit card without having an account with them.

In your search for an online banking home, you can investigate and compare services and interest rates at any of thousands of banks on the Internet. A good place to start is with the Investor Guide's list of the best online banks at <http://www.investorguide.com/Banking.htm#BestBanks>. Banks are listed along with remarks about the services

offered. Virtual banks are noted in bold text as being Internet-only.

The Online Banking Report's list of the 100 Largest Web Banks at <http://opal.he.net/~onlinebr/resources/100.html> is another good place to look. It gives you a list of the 100 largest banks ranked in order by assets, with hyperlinks to each bank's Web site.

Another good place to look is BankOnline's Financial Services Center site (<http://www.bankonline.com>). From there, you can find individual banks by clicking the Banking & Bill Payment link, then choosing an area from a world map and continuing to click area maps or links to further narrow your search. From BankOnline, you can also comparison shop for interest rates, mortgages, loans, insurance, and the like.

Whether you choose a virtual bank or the online services of a physical bank, Internet-based online banking, as opposed to online banking using third-party software, is usually the easiest and least expensive way to go. Most banks offer free access to basic online banking services, such as checking your balances, transferring funds between accounts, and reviewing transaction history. Banks typically charge a nominal fee, usually \$5 or \$6 per month, to process bill payments online. That's not bad, though. After all, if you pay more than 15 bills per month online, then you've saved more than \$5 in postage alone. Take care to ask about the number of bills you can pay online for the basic fee. Some banks charge extra for bill payments that exceed a certain number.

If you decide that you want to use your favorite money-management software as the interface between you and your bank, do not be surprised to find that your bank will want

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- Insurance**
Compare rates online through the Internet's most popular sites.

BankOnline.com's site is a good place to start looking for an online bank.

to charge you about \$10 per month for online banking. That price may seem odd at first glance. After all, you, not the bank, paid for the software. However, that fee may reflect the fact that the bank must pay a monthly fee to the software maker for the service of transferring data between you and the bank. If you are not sure, ask. If you use your money-management software to track your finances, maintain a budget, pay bills, and keep track of tax information, then you may find it well worth the cost to use it for your online banking, too.

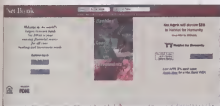
What's Not. In the early years of online banking, most online services required the use of third-party software, such as Intuit's Quicken, Microsoft Money, or a bank's own software interface that you either downloaded from the Internet or received on diskette or CD. This kind of requirement is rapidly going the way of the buggy whip.

With online banking over the Internet, you are no longer required to use such extra software. For most of the larger banks, you can just use your Internet browser and do your banking through the bank's Web site. Though some smaller banks have been slow to abandon the requirement for extra software, you can expect it to fade away over the next few years.

Of course, many people still like to use third-party money-management programs to help manage their finances, and that's fine. It is even desirable and can save you some time, so do not think you have to give up using your favorite money-management software. You do not. However, there may be an extra fee associated



Wells Fargo was the first U.S. bank to offer online services, beginning 10 years ago.



Net.B@nk was the first virtual bank to go online.

with using your financial software, so be sure to ask when you investigate banking online with the bank of your choice.

Most online banks will also let you download your account information, which you can then import into the finance program or spreadsheet of your choice. Most banks usually do not charge for this function. Many banks also have services that will let you automatically update the data in your financial software each time you perform an online banking transaction, which, in itself, can be a real timesaver.

Another online banking practice that is turning out to be short-lived is brick-and-mortar banks charging you an extra fee for the privilege of using their basic online banking services. This extra fee is not to be confused with the fee that most banks charge for online bill paying. That fee is justified, if only by the postage you save. Nor should you confuse it with the fee charged by banks to cover the monthly costs of using a specific third-party interface such as Quicken or Money.

In the beginning, many banks felt that charging an extra fee was justified as a way to help defray the cost of creating and maintaining their online software. As more and more banks get away from the costly process of recreating the wheel, that is, writing their own software interface, it is becoming more difficult for them to justify charging that extra fee. Customers do not like it, and banks like to keep their customers happy.

In the earlier days of online banking, concerns with security and privacy were hot issues that kept many people from embracing

the concept. Now, with the widespread use of secure sockets layer (SSL), better encryption techniques, and secure site certificates, those concerns have become almost non-issues for the computer savvy consumer.

■ What's Next. Online banking is definitely on the upswing. It has been estimated by banking industry officials that more than 16 million households will be doing online banking by the beginning of 2001. According to ePayNews.com (<http://www.epaynews.com/about/index.html>), a site dedicated to electronic banking and commerce, the latest International Data Corp. statistics project a twelve-fold increase in online banking services between 1998 and 2000. So far, those projections appear to be holding true. About 40 of the top hundred U.S. banks already provide fully functional Internet banking, which is more than double the number of only a year ago.

We'll see many more virtual banks and Internet-only credit cards. ATM fees will be lower, and may disappear entirely as online banking becomes more popular.

Where physical banks typically have responded over weeks or months to changes in interest rates and other competitive practices and services, online banks are able to respond to changing conditions in a matter of days, and sometimes even faster. With faster response times, lower fees, and better services, we can expect to see more banking customers switching to online-only banks.

It is certain that the Internet has already changed the face of the banking industry and will continue to do so well into the 21st century. We're not only marching into a new millennium, but into a brave new banking world. **LS**

by Betty Champagne Guthrie

Terms To Know

banking software—A computer program that's required by a bank in order to perform online banking functions with its institution.

encryption—The scrambling of data with special codes, done with a particular kind of computer program, so that no one can make sense of it while it is being transmitted. When the data reaches its destination, it is then unscrambled, or decrypted, so that it can be read.

Internet banking—Another term for online banking, which is also sometimes called computer banking or home banking.

Internet-only bank—A bank that exists on the Internet but does not have a bricks-and-mortar presence.

money-management software—A computer program, such as Intuit's Quicken or Microsoft Money, that you use to keep track of your money and financial affairs.

online banking—Doing all or most of the basic banking activities online, through your personal computer and an Internet connection or a banking software interface. Online banking typically includes at least the ability to check balances, transfer funds between accounts, and review transaction history.

Secure Sockets Layer (SSL)—A security protocol, developed by Netscape, that provides data encryption, message integrity, and security/privacy for data transmitted via Internet connections. SSL is the most

popular security protocol in use on the Internet today.

site certificate—A sign or seal of approval issued by an agency that regularly inspects and ensures that a particular Web site is secure and/or private and follows a specific set of security and privacy rules for it to earn certification from that particular agency. Site certificates, also referred to as security certificates, are usually posted in plain view on the certified Web site. Examples of site certificate issuers are BBBOnline, VeriSign, Trust-e, and Thawte.

virtual bank—The same as Internet-only bank, which is a bank that exists on the Internet, but does not have a physical counterpart

Travel Sites

Web Becomes A One-Stop Trip Shop



study by marketing analysis firm Forrester Research, nine million households booked and bought tickets online in 1999; that number is expected to soar to 26 million by 2003. There's no doubt about it, online travel has taken off, and it's only going higher.

■ **What's Hot.** It's difficult to pinpoint what specific areas of the online travel world are hot because the industry itself is combusting. Travel e-

commerce is expected to rise to \$20 billion by 2001, according to a report by online travel research firm PhoCusWright. This represents a 700% increase beyond the \$2.5 billion in 1998. Certainly anything relating to travel and the Internet is rising rapidly, but a few sectors make up a large slice of this industry.

Corporate travel. Corporate travel makes up the largest portion, and airlines can thank the ample budgets of companies for its current stature. While they aren't the largest online travel destinations, business travel sites are burgeoning with their own portion of the market. In case you were wondering, Travelocity.com (<http://www.travelocity.com>) and Expedia (<http://www.expedia.com>) are the largest online travel destinations.

It's not a mystery why the corporate market is so important to online travel; corporate travelers have money to spend. People are more

conscientious about how much they'll pay for tickets to visit their families than the tab for tickets to a business meeting across the country. Furthermore, when people are planning a trip, leisure travelers have the luxury of browsing for low-priced tickets, whereas the harried businesswoman who needs to be in Atlanta next Monday typically can't find rock-bottom fares.

TRIP.com (<http://www.thetrip.com>) has been seeing green, thanks to the unmanaged harried travelers who belong to the small- to medium-sized enterprises it targets. Business has doubled for the company in the last year (the company declined to provide specific financial information). In November it launched a new, more targeted site, companyTRIP (<http://www.companytrip.com>), which further capitalizes on these enterprises by providing a means for business travelers to not only plan trips online, but also manage them through expense reports.

Biztravel.com (<http://www.biztravel.com>) also goes after road warriors, but it focuses on the small and home office travelers. It provides a similar service but aims to provide everything travelers need to get around in another city. This includes car rentals and hotel bookings.

Airlines. Airlines are the biggest players in travel. They make up about 80% of the \$22 billion market, according to market research company Jupiter Communications. While hotel bookings and car rentals are also taking off, they don't come close to airline ticket sales.

"The travel industry is growing by leaps and bounds," Christopher Kelley, Associate Analyst in Technographics at Forrester Research, said. He recently completed a report citing the booming popularity of the online travel industry. "The question used to be whether people would actually book travel online. Now we're looking at how many flights they will book and how long it will continue."

He said that in a survey of 10,000 online travel participants, 85% were happy with the experience and will continue to book online. This certainly bodes well for online travel booking systems.

If you believed everything you read about America's love affair with the Internet, you'd think we could scarcely live without it. At this stage in the game we could probably survive, but it would be difficult. New business-sectors have sprouted and created thousands of new jobs in the process. Entire industries have been wholly transformed. As an example of its popularity, twice as many people abandoned the malls to do their holiday shopping during the past holiday. The Web brings a bounty to those willing to use it, and each day more people are tapping into it.

However, no industry has been more drastically affected by currents in online commerce than travel. Forget Amazon.com. Bookselling covers under the friendly skies. Those who buy airline tickets, book hotel rooms, and rent cars are contributing to one of the fastest growing sectors of the online market. According to a

What's HOT

- Auctions
- Corporate travel
- All-In-One ticketing

What's NOT

- Travel agents
- Companies selling personal information
- United States-centric focus

What's NEXT

- One-stop shop
- Cruises and tour packages
- Hotel bookings

Travelocity.com and Expedia.com are the two largest online travel Web sites.

Auctions. An incredibly successful anomaly in the online travel world is Priceline.com (<http://www.priceline.com>). It's a brand of reverse-auction that lets you name the price you are willing to pay for airline tickets or hotel rooms, and it will sift through the offerings to find one that matches your price.

Priceline.com's success is incredible. For instance, it was selling approximately 5,000 to 7,000 airline tickets per week and some 1,000 hotel reservations at the beginning of 1999. By the end of the year that number shot to 50,000 airline bookings and 13,000 hotel reservations per week. It even recently extended the name-your-price model to more markets, including new cars, home loans, and even groceries.

As we go to press, Priceline.com's explosive growth is unrivaled. Some reverse-auctions and standard auctions offer airline ticketing, but none has matched the staggering success of Priceline.com. Microsoft's Expedia recently released a similar service, called Hotel Price Matcher, which offers the same service to travelers who want to name a deal on a hotel room. However, last October Priceline.com filed a lawsuit against the company claiming that the service infringes on its patented business methods.

Travel guides. Not everyone agrees on the merits of spending money on travel online, but large numbers are using online resources for planning trips or dreaming about exotic places. A survey from NFO Online Research reported that a huge slice of Web users (70%) have visited a travel-related site. It's little wonder why. Information on destinations is so widely available that seasoned Web users think first of the Web when researching possible destinations.

What's more, the valuable editorial content from book guides, such as Arthur Frommer's Budget Travel Online (<http://www.frommers.com>) and Rough Guides (<http://travel.roughguides.com>), not only have their own Web sites, but they also have partnerships with some of the most used

online travel sites. Preview Travel (<http://www.previewtravel.com>) is partnered with Fodor's Travel Online (<http://www.fodor.com>). Expedia has an agreement with Concierge.com (<http://www.concierge.com>), otherwise known as Conde Nast Traveler, and Lonely Planet (<http://www.lonelyplanet.com>) guides can be found on Travelocity.com. Carefully researched information that could previously be found only in bookstores is all over the Web for free.

■ **What's Not.** Travel agents. While the airlines and all-in-one online agencies are reaping the rewards of surfing the friendly skies, travel agents are left grounded wondering how to subsist in the new online world. Now that customers can collect flight schedules, research entertainment options in different cities, and buy tickets online, they have increasingly less use for travel agents, or other intermediaries.

Travel agents face the hard fact that consumers are adapting very well to finding prices themselves; and more conveniently. People no longer have to rely on an agent's office hours, commission fees, or advice when traveling. They can log onto a host of sites, read about the attractions, book a ticket, and rent a car.

Auctions are big business. Priceline.com Is the No. 1 online travel auction site

Selling your personal information. Frequent flyer programs may be the rage among travel Web sites, but customers need to be aware that exchanging their account information for instant access to a tally of their frequent flyer miles costs them their privacy. And while some sites, such as American Airlines (<http://www.aa.com>), give you true personalization value for money, others can take personal information and turn it over to Internet marketers.

Kelley from Forrester Research (who also reports about online privacy) says, "If these sites are going to put your frequent flyer stuff online, they need to be explicit in how that information is going to be used. If you don't know where that information is going, it doesn't instill trust."

Airline companies will realize this, Kelley says, as they lose business. Increasingly savvy customers are beginning to question the use of feeding information such as name, address, phone number, and credit card numbers on a site, with nothing to show for it. It doesn't cost a consumer anything to switch to a site that does not have such prying eyes, he says, and the online audience might forsake one site's services for another's.

He advises consumers to check a site's privacy policy to see if it will share any information with a third party, either currently or in future. If the site does share collected information, then customers should save their personal information for some other site.

United States-centric focus. Travel Web sites typically assume that primarily Americans will use their services; they've been right. But that will change. While Expedia and Travelocity.com have launched sites catering to the Internet populations in the United Kingdom (UK) and Canada, few have followed their example, and airline carriers have been likewise United States-centric in their thinking.

However, if these sites want to remain top online travel destinations, they need to

look further abroad. Fletcher Research, a UK-based Internet research house, reported last year that by 2004, Germany will have 30 million Internet users, with the UK following closely with 25 million, and France weighing in with 18 million. That will make Europe the second-largest market after North America.

■ **What's Next.** One-stop shop. Vicious competition between the top online travel agents is driving them to invent new ways to keep customers coming back to their site. They've discovered that people value being able to find everything they need to make travel arrangements in one tidy package, thus eliminating the need to surf to multiple sites.

Forrester Research predicts sites such as Expedia, Preview Travel, and Travelocity.com, which are already beefing up content, will continue to forge relationships with more companies, expanding on the one-stop shop idea. This means that someone can go to a site, buy an airline ticket, make hotel reservations, rent a car, and then buy tickets to theater performances for the night he or she arrives. Jupiter Communications agrees, stating, "Travel players should not overlook the opportunity to fill the role of educator and advisor."

ITA Software. One reason many travelers resist buying airline tickets on the Web is that it's difficult to find a bargain. Until now, travel agencies were the only ones who knew how to use the difficult and mysterious systems. They knew that ticket prices were subject to such random requirements as staying over a Saturday

night, agreeing to multiple layovers, and departing from different airports. Although some services allow for limited comparison-shopping, it's up to the user to think of the possible flight combinations to fetch the lowest price.

Enter ITA Software (<http://www.italsoftware.com>), which is easier, better, more innovative, and does what no on or offline travel agent could previously do. It computes the hundreds, even thousands, of combinations available on one trip to truly find the cheapest fare.

Leave it to a group of students to emerge from the Massachusetts Institute of Technology's renowned Artificial Intelligence Lab to come up with something so powerful. These grad school technologists became interested in the SABRE system travel agents use, and decided there had to be a better way to compute all the restrictions on buying tickets. SABRE and the other online travel agents' software simply taps into the airlines' reservation systems for prices.

"While we use the same data as airline reservation systems, we process it much differently," explains Cara Kretz, VP of marketing for ITA Software. "We can check literally all relevant combinations of fares in seconds, whereas the other tools just can't, and a travel agent would take days to do this kind of research. This is the first completely new airfare search engine to come out in decades."

Cruises and tour packages. When e-commerce was in its infancy, people wondered who actually would spend money on the Internet. But the purchasing public surprised everyone and started dishing out. Not only did they spend \$20 here and there on books, but they also spent hundreds of dollars on airline tickets. But it was considered another leap of faith to expect purchasers to drop between \$1,000 and \$2,000 on a cruise or tour package.

The online travel industry has undergone what Jupiter Communications calls "one of the most significant philosophical changes of the past year," and cruise operators are beginning to cash in. Leading the pack is Renaissance Cruises (<http://www.renaissancecruises.com>), which began marketing directly to online consumers before its much bigger competitors even thought about it. Now notable names such as Carnival Cruises (<http://www.carnivalcruises.com>) and Royal Caribbean (<http://www.rcll.com>) are stepping aboard and nudging the market up. Jupiter predicts that by

Terms To Know

disintermediate—Act of doing away with information brokers and allowing the customer to interact directly with the industry.

intermediaries—Individuals who act as a middleman between the customer and the industry. In this case, they're travel agents.

one-stop shop—An over-used phrase that is taking on a new gleam with the travel industry. It refers to larger sites packaging various travel resources in one place.

reverse-auction—Buyers designate an item and the maximum price they are willing to pay for the item; bids higher than that price are not accepted.

unmanaged traveler—These are businesspeople working independently or for small companies who don't submit travel plans to a large department.

2003, online cruise and tour bookings will reach \$640 million.

Hotel bookings and car rentals. While the online travel industry is dominated by air reservations and vacation research, hotel and car bookings are poised to make a leap. Jupiter estimates that by 2003, almost 10% of car bookings in the United States will be made online, as will 8% of hotel bookings. The predicted growth is thanks in part to the one-stop shop movement of putting all needed travel information in one easy-to-access place.

Budget Rent A Car (<http://www.budget.com>) is also working to partner with some noteworthy sites and has made a decent stab at pumping up its Web presence. Presently, Hilton (<http://www.hilton.com>) is forging ahead of the other hotel chains with detailed information for the United States and Japanese audiences. Web lovers can look forward to some needed advancement in hotel sites with more information on rates, availability, and especially more visual information. People prefer to see a room before they commit to sleeping in it. [E]

by Monique Cavelier

Expedia has a partnership with Concierge.com. Travel guides are big business these days.

Job Sites

New E-Lance Sites Let You Put Your Job Skills On The Auction Block



auction in which job seekers, typically freelancers and contractors, bid for jobs posted by prospective employers, and vice versa. The first incidence of true e-lancing seems to have occurred in April 1999 when a group of 16 engineers literally, and successfully, put their services up for auction on eBay (<http://www.ebay.com>).

The engineers were so successful, in fact, that the popular job site Monster.com (<http://www.monster.com>) later unveiled

a special section that they named Talent Market. It uses an auction format and is geared toward freelancers and contract professionals.

Since then, one of the fastest growing Internet job sites in general is the fast-paced e-lance site called eLance.com (<http://elance.com>), founded less than a year ago by former Wall Street traders Srinu Anumolu and Beerud Sheth. Says Anumolu, "We wanted to re-create the kind of excitement you find on a trading floor."

eLance.com utilizes, even encourages, competitive bidding for jobs. This practice gives the job seeker the opportunity to get the best compensation for his or her services and, at the same time, lets the prospective employer get the best combination of technical expertise and cost for the specific job at hand. The fledgling company

has met with such success that it has already grown out of its original cramped one-room New Jersey office and moved into spacious new accommodations in Silicon Valley in California, where it now employs more than 70 people.

As with most job sites on the Web, registering at eLance is free for job seekers.

Though other job sites may not employ competitive bidding as eLance.com does, many job sites connect freelance workers and traditional employees with potential employers in a similar manner. Job sites, such as Guru.com (<http://www.guru.com>), FreeAgent (<http://www.freeagent.com>), and HotJobs (<http://www.hotjobs.com>) have good, state-of-the-art processes for connecting job seekers with prospective employers and are free for job hunters.

Though the process may differ slightly from site to site, job sites such as these let you post your resume in their databases, which are searchable by prospective employers.

The hottest job sites use specialized computer search programs, usually called spiders or bots, to help them match job seekers with potential employers. While spiders and bots are nothing new, using them to screen resumes and job applications is.

Web spiders and bots are not the same thing as the search engines you may be accustomed to using on the Internet. Instead, spiders and bots can be programmed to automatically compare Web pages and documents for specific terms and combinations of words and then perform a specific action.

For example, a Web spider might compare 1,000 resumes with an employer's job description page, scanning the resumes for specific descriptive words and terms that are contained in the job description. If, for instance, the job description contains the words "data base administrator" and the phrase "minimum five years experience," the spider can be programmed to eliminate all of the resumes that do not contain either the words "data base administrator" or the term "DBA" and that do not indicate five or more years of experience.

With the strong business trends to downsize, reorganize, and restructure, you may find yourself downsized, reorganized, and restructured right out the door. So how do you fight back? Use the latest job-hunting techniques and trends on the Internet to help you find a new, and perhaps better, job.

■ **What's Hot.** The hottest new job sites on the Internet use a technique called "e-lancing," not to be confused with "freelancing." Though typically it is freelancers and contractors who use e-lancing for job hunting, it is an electronic phenomenon that can be used by anyone.

E-lancing can perhaps best be described as a kind of eBay for jobs; that is, it's a kind of job

What's HOT

- E-lancing
- Job-seeking bots
- Automatic e-mail notification of job openings

What's NOT

- Lifetime employment and job security
- Pounding the pavement for jobs
- Passive job-seeking

What's NEXT

- More automation via spiders and robots
- More highly specialized job sites
- Increased freelancing due to company downsizing and changing job markets



Monster.com has unveiled a new e-lancing section called Talent Market where you can auction off your skills.

The spider can then forward the remaining resumes to the prospective employer by e-mail, or if desired, send them through an additional screening process.

And that brings us to another process that is really hot with job sites these days: having descriptions of job openings automatically e-mailed to you, based on criteria that you have specified. For example, you may be willing to work anywhere in the United States, but you want to look at only job openings for which the employer will pay for relocation. If you indicate that requirement, the job site spider or bot can send you a notification e-mail when a job opening is posted that matches not only your resume, but also your relocation requirements.

Using the e-mail notification option on job Web sites can help eliminate a lot of wasted time and effort. It's also a good way to help make sure you don't overlook potential jobs by forgetting to check back at that job site regularly.

■ **What's Not.** According to information gleaned from the U.S. Department of Labor's Bureau of Labor Statistics (<http://stats.bls.gov>), lifetime employment in return for corporate loyalty is, unfortunately, a thing of the past. Today, with the increase of downsizing, outsourcing, and consulting, even our more recently acquired ideas of how to find and keep new and better jobs are changing.

It wasn't long ago that job hunters were advised to look for jobs by setting up a Web page that contained their resume or to use their personal Web site to post their resume, then submit that Web page to major search engines, all in the hope that a prospective employer or a headhunter might stumble across it. Such passive sites, while still OK as a backup plan, are very much passé.

Likewise, in the recent past, you may have been advised to post your resume on your Internet Service Provider's (ISP) server, rather than set up a specific Web page for it and to direct potential employers to it there. Again, that might be a mediocre backup plan, especially if you are not looking for a high-tech job, but this plan makes it obvious that your computer and Internet practices are not particularly up to date.

If you are looking for a backup plan, though, searching individual employers' sites is a more effective secondary plan. That, too, is no longer the hottest way to look for a job, but it offers more likelihood of success than does using a pas-

sive Web site.

■ **What's Next.** Ten years ago, few people had even heard of the Internet, much less knew what it was. Today, whether you are currently online or not, the Internet and the World Wide Web have forever changed daily life as we know it. Major changes in business, including the job market that used to take decades to affect the average person's life, may now have an effect within months.

Just as the Industrial Revolution was characterized by increased automation, so too can we expect to see increased automation on the Web. The use of software spiders and bots is already multiplying exponentially, but we can expect to see additional automation geared to the job market. For example, e-Lance's Anumolu says he and his software engineers are working on systems that will automate more of the job-seeking and job-filling task, such as making sure job descriptions are detailed and user profiles are completed in a consistent manner.

We are starting to see more specialization in online job sites. For instance, specialized sites, such as the Chronicle of Higher Education's Career Network site (<http://chronicle.com/jobs>) and the Academic Position Network page (<http://www.apn.jobs.com/apn.html>), are already available to help link teachers with available teaching jobs. In the near future we can expect to see more specialized sites that may, for example, help connect teachers who are on summer vacation with employers who want to hire them just for the summer.

Just as we've seen that there are already some job sites geared to specific segments of society, we can expect to see more of them in the near future. For example, Internet job

sites, such as the Employus site (<http://www.employus.com/body.htm>), which specializes in connecting African-Americans with prospective employers or the Intercristo Web site (<http://www.intercristo.com>), which is aimed at job seekers who want to work in a Christian organization, ministry, church, or school, will become far more prolific.

Whether we love it or hate it, for most of us, work is an immutable fact of life. And so are the Internet and the World Wide Web. Therefore, in today's job market, if you are looking to find a new job, your best bet is to start with the Internet. [S]

by Betty Champagne Guthrie

Terms To Know

bot—Same as spider; special searching software that can be programmed to automatically search for specific information on the Internet.

e-lancing—Using an online (Internet) auction format to find jobs or fill positions on a freelance or contract basis.

headhunter—A term used to refer to someone who makes a living by finding qualified personnel to fill specific job positions in return for a fee that is usually represented as a percentage of the initial annual salary; this is typically paid for by the employer.

passive site or passive job-hunting—Refers to the practice of posting a resume online, usually on a personal Web page or on your ISP's server and waiting for a prospective employer to either come across the resume or express interest in you so you can refer them to the site.

post—(as in "post a resume") With regard to jobs sites, refers to uploading or typing a resume or other information into a Web site's database.

spider—Same as bot; special searching software that can be programmed to automatically search for information on the Internet.

News & Information Sites

Today's Sources Provide You
With More Than You'd Expect



Today's news sites are snazzy, sophisticated, and packed with as much information as an encyclopedia; in fact, they are encyclopedias in some cases. When it comes to Web sites, the trend in news content, technology and strategies can be summarized in three simple words: more, more, more.

■ **What's Hot.** Just as television news has expanded from the big three major news networks, the Internet is redefining what a "news" Web site really is. More sources of information, more interaction, and more customization now unite to create the hottest news sites on the World Wide Web.

Eliminating the middleman. One of the beauties of the Internet lies in its ability to put consumers in touch with all sorts of information, and that includes the Web sites of newsmakers, not just the news reporters. For instance, when the Heaven's Gate cult members committed mass suicide more than two years ago, the group's Web site was overwhelmed with visitors; it marked the first time a significant portion of the population used the Web to receive information without the filters of an established media outlet.

That trend continues, as individuals increasingly go right to the source of the information to learn about major news events. If you want to know what the president said in the State of

the Union address, you can read the full text online rather than view an abbreviated version in the newspaper. In another example, if you want to know how your favorite sports team is performing, don't just read a news wire service's story about them; instead, log on to the team's Web site for injury updates, the latest scores, and game previews.

Portals to a new world. Portal sites, sites that serve as gateways for Web surfers, now include news articles as significant components of their overall content. Excite (<http://www.excite.com>), for example, features top stories, stock updates, personalized weather information, and more. The same is true for sites such as Lycos (<http://www.lycos.com>) and America Online (<http://www.aol.com>).

Web-based news sites. Traditional media outlets have developed their own presences online, too. Sites that are affiliated with local and national television channels, major daily newspapers, hometown papers, and radio stations proliferate on the Web.

Joining them online are a new breed of news sites: news "channels" that are either Web-only or started out as Web sites. One of the most famous examples of this type of site is the Drudge Report, which is home to Matt Drudge, the man widely credited with breaking the Monica Lewinsky story (<http://www.drudgereport.com>). We can expect to see more of these types of news and information sites, in part, because the startup costs tend to be lower than those of other types of media.

Heavy interaction. No longer is news flow a one-way process. Consumers aren't content to just sit back and absorb the news; they want to participate in it. That's why the better information sites let you interact with other visitors and register your opinions on newsworthy events. Online polls, live chats, message boards, and other interactive features increasingly involve visitors. (One tip: Many sites require registration prior to participation in these types of activities. Before handing over your e-mail address, read each site's privacy policy to ensure that it does not sell your data to third-party marketers.)

News hasn't changed all that much in the past 200 years. Natural disasters have been plaguing us for centuries, epidemics still sweep the globe, and human drama—ranging from one-person heroics to major events such as wars—has been capturing our attention for generations, and promises to do so for years to come. What has changed, however, is the news delivery mechanism. Newspapers, radio, television, and now the Internet, are changing the way in which we see and interpret the news.

The Internet's news and information sites have changed dramatically in the past few years. When news sites first began to establish themselves on the Web, it was enough to have daily updates to stay ahead of the curve. No more.

What's HOT

- Multimedia content and interaction
- E-mail news alerts
- Portals featuring breaking news

What's NOT

- Text-only sites
- Sites charging for content
- Old and stagnant information

What's NEXT

- One-stop news and information
- Advanced delivery devices
- Built-in capabilities for multimedia

Customized news and information. Web publishers have talked about personalized news for some time, and the potential is finally being realized. InfoBeat (<http://www.infobeat.com>) delivers personalized news to subscriber e-mail boxes at no charge, and this service now numbers more than 2 million members. The Weather Channel (<http://www.weather.com>) lets visitors customize the information that displays on-screen for them when they log on. In addition, Yahoo! (<http://dailynews.yahoo.com>) offers News Alerts, whereby you create a profile, and Yahoo! notifies you when a news article matches your interest.

■ **What's Not.** Not unlike the rest of the Internet, news sites have evolved into something more than mere text, yesterday's news, and fee-based subscription-only societies.

Text-only Web sites. Streaming media, which is sent in a continuous stream rather than as a hefty file that must be downloaded entirely before it is played, is becoming quite common on news sites, and sites that don't have multimedia seem boring by comparison.

You'll probably run across three main types of streaming video: WindowsMedia (<http://www.windowsmedia.com>), Real.com (<http://www.real.com>), and QuickTime (<http://www.apple.com/quicktime>). The news site should indicate which type of streaming video it uses and direct you to a site where you can download the video player (if you don't have it already).

Streaming audio, a subset of streaming media, is also a popular news-related technology, and you can try it out for yourself at the king of all audio sites, Yahoo! Broadcast (<http://www.broadcast.com>). Here you'll find news channels such as the BBC, CNBC/Dow Jones, and your local TV news, as well as sports channels covering a wide range of contests, computer talk shows, health and fitness shows, and so on.

To see how multimedia enhances news sites, head to The Nando Times (<http://www.nando.com>), a national site that has its roots in the electronic edition of the *News & Observer*, a daily newspaper based in Raleigh, N.C. Scroll down the home page and look toward the left to see "News That Moves," an interesting animation presented every weekday. A recent poll asked whether primary care physicians are expected by their patients to do too much, and the animated graph showed the results. (In case you were wondering, nearly three quarters said the amount was just right.) Interesting tidbits such as this are sure to become more popular with news sites and their visitors.

Subscription news sites. One area in which the customer is a clear winner is in the trend moving away from charging for access to Web content. While news sites are still learning how to turn a profit online, they are in large part turning away from charging visitors for online access to content.

ESPN (<http://espn.go.com>) has scaled back the percentage of features that a visitor must pay for. Slate (<http://www.slate.com>), the Microsoft magazine edited by Michael Kinsley, used to charge a subscription fee to all readers, but it now offers the online articles for free; the services that subscribers must pay for include Slate e-mail services, twice-monthly chats with Slate writers, and gift certificates for the Slate store.

If this trend continues, you can expect subscription fees for news-related Web sites to disappear, except for those at highly specialized sites such as the LEXIS-NEXIS online databases (<http://www.lexisnexis.com/lnc>).

Stale content. When we want to know what's going on, we expect immediate gratification. The superior news sites know this and respond by frequently updating their articles. Daily newspapers put fresh stories more frequently than once a day, and sites such as CNN (<http://www.cnn.com>) change their Web pages several times an hour. In addition, these news sites often indicate when information is fresh by clearly posting update times.

■ **What's Next.** No matter what the news is, the media always manages to make use of the latest technologies to transmit the daily events to you faster, better, and with more pizzazz.

Mega news sites. Another trend that benefits consumers is that of information sites merging to create mega news sites for one-stop news and information shopping. Britannica.com may be well-known for its comprehensive encyclopedia offerings (<http://www.britannica.com>), but it has partnered with washingtonpost.com to offer breaking news stories on its home page, as well.

Advanced delivery devices. Consumers now have more options for how they want to receive their online news and information. We've already mentioned the popularity of e-mail delivery for breaking news headlines and articles, and other delivery mechanisms are on the horizon. Portable wireless devices, such as small-screened cellular phones, are perhaps the most anticipated of these advanced delivery methods.

Built-in capabilities for multimedia. If determining what multimedia capabilities your browser has (and hasn't) is holding you back, take heart in the fact that browsers are constantly

being enhanced (and usually at no charge to consumers). It's possible, thanks to built-in multimedia capabilities, that in the near future you won't have to do anything other than click an image to see a video clip of a breaking news story.

■ **What's Now.** The content at news sites can be overwhelming and finding a legitimate site may seem like a difficult prospect. Even so, finding a legitimate site online is not unlike finding legitimate news offline. So choose brand names you trust; look for sites that update content regularly and inform you when they do; and find out who created the site, including the content sources, the credentials of the site, and the group's background (is it the official site?). And yes, don't forget to take everything that isn't verified with a grain of salt. [E]

by Heidi V. Anderson

Terms To Know

co-branding—When news and information sites unite to create one Web site. CNN and Sports Illustrated (<http://www.cnni.com>) demonstrate how two media outlets can work together to create one comprehensive site.

e-mail alert—News sites send out messages via e-mail to alert readers about breaking news stories. InfoBeat (<http://www.infobeat.com>), for example, e-mails members when hot stories hit the wires and regularly e-mails scheduled new briefs (with links for some of the longer articles).

portal—A Web site that attempts to be the starting point, or gateway, for visitors as they begin each Web surfing session. Its purpose is to guide surfers to just about anything they want to find online and provide as many services as possible in one place, such as free e-mail accounts, stock listings, and personalized news.

streaming media—Audio and video data that transmits from a server to an end-user and displays on-screen as it arrives. Users do not download an entire audio or video clip; instead, they use an application to see or hear the clip as it transmits.

Bots

Shopping, Finance & Chatter Bots Learn To Search For You



The dawn of the bots in cyberspace always promised to bring fruitful days to Web users. It's just taken longer than many people expected for the sun to rise.

The original vision of bot technology on the Web, that of silent herds of tireless task-hounds combing the furthest reaches of the Web for pearls of information, gave way rather unceremoniously to a somewhat less-inspiring reality: hordes of drones, misdirected by information overload, wandering in endless search loops and clogging regular Internet traffic along the way.

But the promise remains, and if the mid-90s represented something of a dark age on the Web, bots seem to be emerging into a Renaissance. Today's bots come in all shapes

and sizes, and they perform all manner of tasks. You can employ a spider bot, for example, to scour the Web for documents containing information about a certain topic. A stock bot can retrieve investment information for each new IPO that hits the market. Webmasters use bots to maintain links and create indexes for their sites. Marketing companies use bots to gather information about consumer demand. And a good e-mail bot

will automatically can the spam you receive from marketing companies who unleashed their research bots on you.

In this article, we'll survey the current crop of Internet bots, examine a few popular representatives, and look ahead to the not-so-distant future of bot technology.

■ **What's Hot.** Hands down, the leaders of the bot revolution, at least in terms of popularity among Web surfers, are the **shopper bots**. Given the massive groundswell of online retailing in the past year or two, the popularity of these bargain-savvy critters stands to reason. Retail competition increases with each new merchant that sets up shop on the Web, and the price-conscious online

consumer can spend hours looking for the best deal possible on that new pair of rollerblades. Shopper bots can eliminate a huge amount of browser time by doing virtually all of the hunting for you.

While the best shopper bots can search a vast number of online retail sites for a department store cornucopia of merchandise items, be aware that even the developers of shopper bots are hoping to make a buck or two. This is the reason many comparison shopping sites have forged cooperative deals with specific online merchants. A conflict of interests? Not in today's endlessly cross-marketed economy. And the overall usefulness of such bots is still ample. Still, in accordance with the old adage, caveat emptor, it might pay to use a couple different shopper bots in tandem.

The following are a few of the more popular shopper bots currently awaiting command to do your bidding.

DealTime (<http://www.dealtime.com>) lets you search for products based on item, price, manufacturer, and even model number. Because you can define a search period by entering a date range, the DealTime bot can keep hunting long after you've decided to pack it in, keeping you informed of prices and locations via e-mail, your personal pager, or a specialized icon you can download to your desktop.

Auction hounds can use **BidFind** (<http://www.bidfind.com>) to scour more than 300 online auction sites for everything from antiques to left-handed golf clubs. And if you can't find the item you're looking for, you can post it on BidFind's Wanted page for all potential sellers to see.

The bots of the Jango/Excite Product Finder (<http://www.jango.com>) crawl their way through most categories of merchandise, sifting through merchant sites, auction sites, and classified ads. If you just can't seem to choose between competing brand names, you can use Jango's review finder to scare up product reviews for the item in question.

What's HOT

- Shopping bots
- Finance bots
- Personalized bot services

What's NOT

- One-size-fits-all bots
- Keyword locators
- Novelty chatterbots

What's NEXT

- Recommendation engines
- Artificial intelligence
- Intelligent chatter bots and data-mining bots



Alice the chatter bot
"learns" to converse from
the questions users ask.

The mySimon bot (<http://www.mysimon.com>) uses a proprietary technology called the Virtual Learning Agent to mimic the common shopping patterns of the average consumer. Simon, the bot's lantern-jawed mascot, retrieves price, shipping, and warranty information from thousands of online merchants selling everything you could find at the mall, and probably more.

As a category, shopping bots are rapidly evolving into multifaceted consumer services. Companies, such as San Francisco-based Active Research (<http://www.activeresearch.com>), are integrating shopper bots into full-blown recommendation engines. Recommendation engines don't just compare prices, but they also compare value, based on personal preferences that you enter and shopping habits you exhibit. Such megabots can do more than just make buying recommendations based on your consumer profile. In theory, they'll be able to actually preempt your purchasing whims, say, by notifying you of the availability of that priced-to-sell 42" Sony Trinitron you know you'd love. To many consumers, this concept may seem as irresistible as it does frightening, which is why we think integrated recommendation engines have the potential to revolutionize the online shopping experience before next holiday season. At press time, for example, Lycos, GoNetwork, and mySimon all had signed on to incorporate Active Research's flagship product, the Active Buyer's Guide, in their search pages.

On the heels of the shopper bots are finance bots, which can gather personalized investment information for the market novice and the intrepid day trader alike.

For example, you can retrieve company information and track performance statistics for any group of corporations you choose using the CompanySleuth bot (<http://www.companysleuth.com>). The Navigate One bot retrieves Web links to all financial information associated with a stock symbol or currency you enter. You can access a free Quick Search version of NavigateOne (<http://www.NavigateOne.com/quick/Quick.asp>), or you

Chatter bots, for example, are popping up around the Web in increasing numbers, but most are still functionally equivalent to novelty items.

can register for a free trial period of the bot's professional version (<http://www.NavigateOne.com/quick/Upgrade.asp>). The Finance Wise search engine (<http://www.financewise.com>) dispatches its bots only to large but select groups of sites that are making headlines in the high-stakes financial world, collecting focused research and performance data for just about every money topic imaginable. And for \$9.95 per month, the IPOPatrol bot (<http://www.ipopatrol.com>) monitors the IPO notification pages E*TRADE, DLJdirect, and Wit Capital, apprising you with an e-mail of every new Initial Public Offering it sniffs out.

The specific bots discussed in this article represent a few examples of the many bots currently in circulation. For a comprehensive listing of all known bots in all categories, with links and summary reviews, check out the BotSpot (<http://www.botspot.com>).

■ **What's Not.** The days of the generic search engine, the basic keyword locator that functioned the same for everyone, are long over. Virtually all major online search sites now cater, at least to some degree, to the strong desire among users for personalized service. Lycos, Excite, DealTime, and mySimon, to name just a few of many examples, all let you customize a personal start page containing continually-updated links to Web content you specify. Many sites send you an e-mail or notify you by some other method you specify when news breaks in your areas of interest. Today's bots also cater to the "virtual community" in

new ways. Lycos, for example, uses intelligent agent technology supplied by WiseWire (<http://www.wisewire.com>) to "learn" from community opinion as it assembles Web content into topic-based channels, or wires.

In general, however, in the current field of bot development there seem to be few truly irrelevant areas. One can always judge a

technology by its popularity with users (Betamax VCRs come to mind). But at its core, bot development, unlike Web browser enhancements or new releases of office software suites, is inherently about discovery. So while a shopper bot will always be more widely used than a specialized intelligent data-mining bot or a bot designed specifically to help programmers create other bots, the former technology isn't necessarily more important than the latter.

Still, some classes of bots are further from fulfilling their true potential than others. Chatter bots, for example, are popping up around the Web in increasing numbers, but most are still functionally equivalent to novelty items.

Chat bots use natural language analysis to conduct semihuman conversations with users. Some chat bots are especially clever about disguising their robotic natures, intentionally using eerily human techniques, such as typos or bad grammar. The current crop of chat bots is primarily useful as entertaining, high-tech Mad Lib games. For example, if you strike up a conversation with Erin, the chat bot bartender at Extempo's Virtual Bar (<http://www.extempo.com/webbar/index.html>), you're likely to get some snappy comebacks and an entertaining dose of Rock 'n Roll trivia. ALICE the chat bot (<http://206.184.206.210>) uses words and

phrases she has learned from conversations with people all over the world, and she can generally maintain a semi-realistic conversation of up to three or four exchanges before breaking down.

The most important thing about chatter bots is their future potential, which seems endless, depending on the rate of advancement in the field of Artificial Intelligence (AI). Automated help desks run by intelligent chat bots, for example, are soon to be commonplace. Travel agent chat bots will help you plan trips. The software developer



The mySimon bot "studies" your buying habits so he can scour the Web for the best deals.

Neuro-Media(<http://www.neuromedia.com>) already employs a chatter bot named Shallow Red, a tongue-in-cheek reference to the infamous IBM supercomputer Deep Blue, to answer common questions about the company and its products. These examples represent only the tip of the Alceberg where bots that speak like humans are concerned.

■ **What's Next.** Without question, the future of bot technology will be defined by the continued development of AI.

AI is the branch of computer science concerned with developing computer systems that can think, reason, learn, and act without direct human intervention. In theory, a fully intelligent bot would be able to perceive its own environment and modify its behavior in response to it. A fully intelligent bot would

carry out your requests, learn on its own, handle increasingly complex tasks through independent reasoning, and even anticipate your needs based on what it "knows" or has recently "learned."

Currently, this level of AI is still the stuff of which science fiction is made, at least as far as mainstream Internet users are concerned. But thanks to the flurry of development that has occurred over the past several years, each new generation of bots is smarter than the last. Many data mining bots already use their own internal logic to sift data and refine their search methods as they go; we believe that this class of bot, perhaps more than any other, will be integral to distilling actual information from the ever-growing mass of data on the Internet.

But MIT's Things That Think consortium (<http://www.media.mit.edu/ttt>), a group of top computer scientists devoted to the field of AI research, believes the future of intelligent bots is hardly confined to a computer screen. "Your shoes," says the TTT consortium, "should be retrieving the day's personalized news from the carpet before you even have time to take off your coat. We must expect more from our environment."

At least we can await the coming of spring with our bare feet on the numbskull throw rug while we wait for the footware that knows more about current events than we do. [E]

by Sean Doolittle

Terms To Know

agent—Common usage has made the terms bot and agent essentially interchangeable. By definition, an agent is a piece of software that can carry out a specific mission without direct human intervention. The mission of a software agent usually consists of automating a task or retrieving some piece of information and bringing it back to the user.

artificial intelligence (AI)—AI is the branch of computer science concerned with instilling humanlike thought, logic, and learning capabilities in computers. MIT professor John McCarthy coined the term artificial intelligence in 1956. Today, the field of computer AI has branched into games and entertainment, decision analysis, natural-language interaction, neural networking, and robotics (both hardware and software). True artificial intelligence has not yet been achieved; however, developmental advances in AI are visible, particularly in the field of computer games. Advanced

computer chess programs, for example, have beaten humans, most notably when an IBM supercomputer known as Deep Blue defeated grand master Gary Kasparov in 1997.

bot—Short for robot. The *Merriam-Webster's Collegiate Dictionary* defines robot as "a device that automatically performs complicated often repetitive tasks." A bot is a software robot that automatically performs some computer task. MIT professor Joseph Weizenbaum invented one of the first working software robots in 1966; named Eliza, this program notoriously mimicked a psychotherapist by answering user questions with questions of its own. Eliza worked by analyzing the language of the questions asked, then matching identifiable linguistic patterns with pre-programmed responses.

Many modern software applications employ bots to simplify tasks. The Hypertext Markup Language (HTML) development package Microsoft FrontPage, for example, offers an add-in

component containing bots that automate many tedious aspects of Web page development, such as displaying the date and time.

The bots discussed in this article are Web-based programs designed to automatically perform tasks, such as finding and retrieving information. Bots can be highly specialized, and some bots use internal logic to "learn" from experience.

data mining—The process of examining large masses of information for specific characteristics, trends, or patterns. For example, data mining bots can search online databases to help marketing research companies find users with common surfing habits. True data mining doesn't just present existing data in alternative ways; it actually discovers new relationships among data.

search engine—A search engine is a program that searches documents for a specific keyword or phrase, indexes what it finds, and returns a list

of locations where the documents reside. A search engine works by sending out a specialized bot called a spider bot to retrieve as many documents as possible. AltaVista (<http://www.altavista.com>), Yahoo! (<http://www.yahoo.com>), Lycos (<http://www.lycos.com>), and Excite (<http://www.excite.com>) are among the most popular engines for searching the World Wide Web.

spider—A bot that automatically retrieves Web pages and delivers them to a search engine. A spider "crawls" the Web in search of documents, bringing what it finds back to the search engine's database. Hence, spiders are sometimes referred to as webcrawlers. Metasearch engines, such as MetaCrawler (<http://www.metacrawler.com>) send multiple spiders to other search engines to retrieve and catalogue information that other spiders have already found. Large search engines, such as AltaVista, have many spiders working together.

Videoconferencing

Face-To-Face Online Conversation
Is Closer Than You May Think



One complaint we often hear about online interactions is that you miss the visual cues you normally get when you communicate with someone face to face. As convenient as it is for many of us to work from home or send e-mail rather than drive across the country to visit, there are times when you want to see the person you're speaking with. In business, there is the need to bring groups together for discussions and meetings, and in your personal life you may want to use technology to let your kids visit with their grandparents.

Fortunately, digital video technology is advancing to the point where seeing and hearing other people online is becoming

commonplace. Just as we're getting used to working at home in our bathrobes, desktop videoconferencing is becoming more of a reality.

Even though the AT&T Picturephone was first introduced to the public at the 1964 World's Fair, until recently you had to pay big bucks to get a real-time audiovisual connection. Early videoconferencing technology required you to basically build your own broadcast studio, and with a price tag that could run as high as \$1,000,000, only large and affluent corporations could afford to use videoconferencing.

However, with the emergence of the Internet and the addition of high-quality audio and video cards to today's multimedia PCs, everything has changed. Although most

video applications and desktop cameras for the home market don't provide broadcast quality, almost any newer computer with a fast Internet connection can provide a usable audiovisual connection. What's more, the quality of videoconferencing equipment and software is improving every day, and many telephone companies and local communities are already planning for the provision of commercial-quality videoconferencing. Add to that increased Internet bandwidth, and you're looking at a bright future for videoconferencing.

■ What's Hot. The improvements in videoconferencing are mirroring the improvements in Internet and PC technology as a whole. If you've been online for a few years, you remember the frustration of surfing the Web with a 14.4 kilobits per second (Kbps) modem. If you thought reading your favorite newspapers online with that connection was slow, viewing full-motion video never even crossed your mind. However, as connection speeds have improved, so has videoconferencing technology. Here is what's driving the videoconferencing market.

Faster connections. Around the world, the cables that are used to carry Internet packets are growing larger and faster as backbone companies try to keep up with the ever-increasing rate of Internet use and flow of information. The "pipes" that travel into our homes are getting bigger too, as more and more people start going online via local phone company Digital Subscriber Lines (DSLs) or cable modems. Video and audio files can chew up a tremendous amount of bandwidth, and latency problems (slow or lost data packets),

What's HOT

- More bandwidth
- Smaller cameras
- Home connections
- Software interoperability

What's NOT

- Jerky still-frame pictures
- Wasted time
- Per-minute charges

What's NEXT

- Videoconferencing everywhere
- Bigger pictures and better sound
- Video to your cellular phone

both in your home and through the Internet, are the main cause of poor video and audio quality. So, if you want to participate in online video conversations, find the fastest home connection you can.

Inexpensive videocameras and conferencing software. Digital video cameras have grown smaller and cheaper over the years as well, and you can get free videoconferencing software online. The most popular videoconferencing program today is White Pine's CU-SeeMe (<http://www.wpine.com>), which is used with tiny cameras called Web cams. A Web cam sits on top of your monitor and either sends out still pictures at certain intervals or streams video continually across your Internet connection. However, with this kind of low-end setup, only one person can speak at a time, and when that person talks, all the others who are connected cease transmitting and appear only as still photos.

Thousands of Web cams are online, and you can connect to many of them from the WebCam World site (<http://www.webcamworld.com>). Most Web cam sites are one-way only; that is, you can see whatever the site is transmitting but you can't talk back. In order to set up a connection with another person or a group, you'll need to connect either by using an online router (CU-SeeMe offers this service) or connect directly to the other person. The details of how to do this will vary depending on the software you use.

There are several different types of videoconferencing connections you can make. With point-to-point conferencing, you talk with one other individual through a direct connection, just as if you had made a phone call. You will need to know how to find that person online by either using his or her name or e-mail address at an Internet locator service (ILS) or by using his or her Internet Protocol (IP) address directly.

You also can have a group videoconference, which is like being in a chat room that uses

audio and video instead of (or in addition to) text. To have a group conference, you will need to connect to a server that hosts conference groups (as mentioned for CU-SeeMe above). A group conference that connects directly, without using a server, is called a multicast. You need to use software that supports this kind of connection to multicast.

Another type of videoconference is the cybercast, which is more like a TV broadcast

Education, are using videoconferencing to provide long-distance learning opportunities, as well as local access to videotaped courses. And, if videoconferencing specialists FVC.com (<http://www.fvc.com>) have their way, you'll soon be seeing V-Kiosks, which distribute streamed video, audio, images, and text over broadband networks, everywhere.

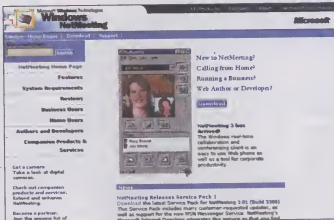
■ What's Not. In today's society, you want to stay away from most things that take longer or cost you more money. Videoconferencing is no different. Below are some of the ideas that are being phased out by the new generation of videoconferencing.

Slow modems. Obviously, your old modem isn't going to take you very far in the new videoconferencing era. If you have a 56Kbps modem, you'll get a nice stream of still pictures and some almost-continual streaming video using products such as RealPlayer. However, if you really want to experience interactive video online you'll need the fastest Internet connection you

can get. Even with a fast connection to your home, though, you may be plagued by latency problems out on the Internet. Unfortunately, even the largest Internet service providers (ISPs) and backbones can become congested, and your video and audio quality will suffer.

Proprietary software connections. Don't use software that only connects to other versions of itself. Interoperability is key if you want to be able to connect to other people. Because there are many kinds of videoconferencing software in use, choose software that you can use to connect to the widest variety of other users.

Wasted travel time. There may be times when you need to travel on business in order to provide some hands-on services, but if you only need to have a meeting or speak with other people, don't waste your company's time and money on business travel. Instead, use videoconferencing when you need to talk with clients or co-workers, and save yourself and your company time and money.



Microsoft's NetMeeting is targeted to business customers, but you can use it for personal videoconferencing, as well.

where a host talks and perhaps gives a video display while others look and listen. Cybercasting can allow many people to view a conference or event beyond those who can fit in an auditorium.

Another popular combination for low-end videoconferencing uses ICQ (<http://www.icq.com>) to locate people and then launch Microsoft's NetMeeting (<http://www.microsoft.com/windows/netmeeting>) to conference with another person or a group of people.

Broadband video. Businesses that use videoconferencing usually connect with faster, more advanced, and more expensive software and hardware that allows workers to not only talk together but also work together on documents or share applications. But videoconferencing is not only a business application these days. Colleges and universities, such as Case Western Reserve, Harvard Business School, and Pennsylvania's State System of Higher

With point-to-point conferencing, you talk with one other individual through a direct connection, just as if you had made a phone call.

Most people also spend a lot of time commuting to work every day. But when you work at home and telecommute you can miss vital conversations and interactions at the office. Videoconferencing can help by allowing you or your employees to occasionally work at a distance, either at home to save on commuting time or from a client's office. By using videoconferencing to keep in touch, you will be able to make the best use of your time and help yourself juggle the many responsibilities of work and home life.

Expensive per-minute charges. In the old days, phone companies charged by the minute for long-distance conversations. Some companies have tried to bring that pricing model online, as well. But with many free video servers out there and sites that will connect for business purposes at low hourly rates, per-minute charges are a doomed concept. Make sure you shop around and get the best deal for your videoconferencing needs.

■ **What's Next.** In the next few years, we probably won't see "Jetsons"-like pop-up television phones, but we will be running into videoconferencing in more and more places, especially in the home. As more companies and communities invest in hardware, high-speed Internet access costs will come down, which will expand the use of videoconferencing beyond rich companies.

Corporate investments will bring broadband video everywhere. Microsoft recently announced that it plans to invest \$10 million in InfoImage, a company that makes software for corporate Web sites, in order to provide Microsoft users a "digital dashboard" online. This personalized Web page will include videoconferencing capability. White Pine is promising a Linux version of its commercial conferencing server, MeetingPoint. Additionally, Cisco

Systems, the largest maker of Internet routers, plans to provide two products aimed at business videoconferencing markets. Finally, FVC.com has signed contracts to deliver broadband video services to both European and U.S. telecom providers, in addition to working with American universities. With large companies such as these making constant investments in video technology and video markets, the future will certainly bring expanding video and audio capabilities into our lives and onto our desktops.

Video on your cellular phone. Packet-Video (<http://www.packetvideo.com>), a relatively new company formed with investments from Siemens and Intel, was formed around the idea that the next big technology convergence won't be computers and television, but rather computers and cell phones. Wireless technologies, combined with advances in video and audio software, may soon bring full-motion, real-time video interaction to your cell phone. Although it will probably be awhile before we talk to each other in full-body holographic detail as people do in science fiction movies, it may not be long before we can take real-time video connections with us wherever we go.

The broad impact of interactive video. Video is going to become more common not only in business but also in education and medicine. Broadband video will allow medical specialists to view patients in distant locations without having the costs of travel to hinder treatment. In addition, video classrooms will allow students access to classes they may not otherwise be able to participate in because they are taught so far away.

As computers get faster and bandwidth grows, we may become accustomed to talking with and watching our friends and co-workers any time of the day or night, from anywhere around the world. Our ability to stay in touch with old friends (and to make new ones) could be wonderfully enhanced, and we will have more access to in-depth information.

At the same time, as our workplace reaches ever further into our homes, we will have to face the questions of where to draw boundaries and how much access we want to allow others to have to our lives and our likeness. As Web cams show up on every street corner, there will be fewer parts of our lives that are truly private. Not everyone will want to work and live in the public eye all day every day. After all, there may be times when we'd rather keep working in our bathrobe. [E]

by Jennifer Posell

Terms To Know

backbone—The part of a network that carries the majority of the data traffic. Backbones connect smaller networks, or nodes, to create larger networks. Backbones usually transmit data at higher speeds than the rest of the network. On large networks, such as the Internet, there may be more than one backbone, all of which span long distances.

bandwidth—A measure of how much data can be transferred from the Internet to your computer and vice versa. Early modems transferred data at speeds such as 2400 bits per second, while the newest modems are rated at 56 kilobits per second. Today's broadband connections are much faster; a Digital Subscriber Line connection can carry as much as 1.5 megabits per second (Mbps), and cable modems can carry as much as 10Mbps.

compressor/decompressor (codec)—Any technology used to compress and decompress data, which can be done with hardware, software, or a combination of the two. Different technologies perform this in different ways.

Internet Protocol (IP) address—The address of a computer on a Transmission Control Protocol/Internet Protocol (TCP/IP) network. IP addresses are written as four groups of up to three digits, each separated by periods. An example is "119.183.115.11".

interoperability—The ability to communicate with different software or hardware packages, no matter which combination the two different parties are using. This is especially important with videoconferencing because there are so many different software packages available.

latency—Transmission delays typically encountered when any packet-switched network (such as the Internet) gets congested. Latency means part of your data moves slower than the rest; the result is lower-quality audio and video transmission.



FVC.com has partnered with communities and educational institutions around the world to provide videoconferencing technology for everyday use.

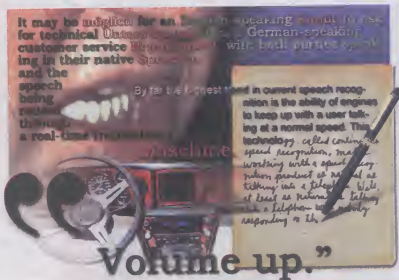
Voice Recognition

Watch For An Abundance Of Voice-Operated Products

When it comes to communication, nothing beats speech, unless you're a computer. You've been reading about all sorts of technological breakthroughs in this issue, from processors running at gigahertz (about 1 billion cycles per second) speeds to hard drives that can house hundreds of gigabytes (approximately 1 billion bytes) of information. Unfortunately, none of these advances has graced computers with the uniquely human trait of true speech comprehension.

The binary nature of computers certainly hasn't prevented researchers from working on ways to create programs that react to voice commands, recognize voices, or even speak back in a human voice. We looked at the capabilities current products offer, found out what technologies are being phased out, and researched the directions computer speech technology is headed in the future. The results were more promising than we had hoped.

■ What's Hot. By far the biggest trend in current speech recognition is the ability of engines to keep up with a user talking at a normal speed. This technology, called continuous speech recognition, makes working with a speech recognition product as natural as talking into a telephone. Well, at least as natural as talking into a telephone with nobody responding on the other end of the line.



Many current engines use predictive technology based on grammatical rules to guess at what a person is trying to say. If the guess is correct, more time is available to translate other words, and overall accuracy is increased. Of course, when the predictive algorithm fails, valuable time is wasted.

Vocabularies for speech recognition engines have exploded as standard memory sizes and processor speeds have increased. Dragon Systems's famous Dragon NaturallySpeaking product line has a 160,000-word working vocabulary out of a total vocabulary of 250,000 words, meaning at any one time it can recognize one of 160,000 distinct words.

Specialized vocabularies are making speech recognition very useful in professions such as medicine and law. A good example is Lernout & Hauspie's Voice Xpress line, with special

medical and legal versions. Instead of providing a generic professional dictionary, dozens of detailed dictionaries are supplied, such as pediatrics, neurology, or primary care. The addition of these dictionaries virtually eliminates training time for professionals and dramatically reduces errors in fields with specialized vocabularies. Most engines also have the ability to learn thousands of new words, so dictionaries can be supplemented with terms users frequently use.

Enhancing safety is a popular use of speech recognition right now. Products such as Clarion's AutoPC, for example, are used to make driving safer. People using the system don't have to take their hands off the wheel to perform common tasks, such as switching radio stations or using the telephone. Instead of their hands, users simply voice com-

mands to activate these features. The AutoPC also performs extraordinary tasks, such as reading e-mail, from your car.

We primarily looked at advances in English speech recognition for this article, but researchers are tackling a number of languages at this time. Some of the most amazing research is directed at languages, such as certain Chinese dialects, famous both for their total nature and enormous alphabets. Microsoft's Natural Language Computing Group is currently tackling this problem, and the technology that results should advance recognition in easier languages, such as English.

The opposite of speech recognition, speech synthesis, is another hot technology that is steadily improving. In speech synthesis, text is fed through an engine that determines what pitch and intonation to give to the words, resulting in artificial speech. Anyone who ever

What's HOT

- Continuous speech recognition
- Multiple language support
- Natural-sounding speech synthesis

What's NOT

- Discrete speech recognition
- Training
- Current prices

What's NEXT

- Voice-operated everything
- True user independence
- Handheld PC integration

had a Speak & Spell knows how artificial synthesized speech sounds, but the technology has evolved to the point where it can sound eerily realistic. At least one company, Microsoft, accomplishes this by drawing from a base of phonemes taken from actual human recordings, using the engine to apply basic pitch and tonal information.

The popularity of e-mail guarantees that speech synthesis is here to stay. It is already possible to access e-mail accounts using a normal telephone, navigating with the number pad and feeding e-mail contents through a speech synthesis engine. The best of these services, such as General Magic's myTalk (http://www.mytalk.com), use a hybrid of real recordings for menu navigation and synthesized speech for the actual reading of dynamic content such as e-mail.

Text-to-speech is also a terrific proofing tool that makes a great partner for a speech recognition engine. Dictate to the speech engine and feed the results to the text-to-speech engine. It beats hunting for errors word by word. Microsoft plans to release a text-to-speech engine called Whistler with Windows 2000. It will say words as users type to aid in proofreading.

Sometimes human voice recordings are compiled and then strung together to create sentences. This kind of technology has been used for years to create live commentary in computer sports games, for example. It works well in situations where the speech engine has to respond only to certain input, such as a request for current weather conditions where the temperature and wind speed are sandwiched dynamically between fixed opening and closing statements.

None of these things would be possible without the current power of central processing units (CPUs). Speech recognition algorithms are extremely computation intensive, and until recently, processors simply did not possess the brute force necessary to efficiently carry out the translation. It is amazing to run an older speech recognition engine on an older PC and then use exactly the same engine on a machine with a new Intel Pentium III or AMD Athlon CPU. Although the algorithms do not change, the accuracy of the speech engine jumps up several percentage points when used in concert with the newer processors. When newer engines are

used with the faster processors, accuracy can increase to the 99% range.

■ What's Not. Continuous speech recognition wasn't always the norm. The technology was preceded by discrete speech recognition, where speakers were forced to pause after each word so the engine could keep them separated. As continuous speech recognition technology improves, discrete recognition engines are losing their status as the most accurate technology. A discrete recognition engine might be a better choice for users with processors slower than a Pentium II, but everyone

can be accomplished during the training process.

Users with regional accents or who speak a particular dialect face additional problems. It is hard enough to create a speech recognition engine that can process the perfect diction of a news anchor, let alone an engine capable of handling non-standard regional pronunciations. It will be awhile before everyone can benefit fully from speech recognition.

A major obstacle that speech recognition technology may never overcome is people's reluctance to talk to inanimate objects. We tested speech recognition software several hours a day

for over three weeks and never failed to feel awkward while murmuring to our monitor. We can scarcely imagine a roomful of employees talking into their headsets or directional microphones to give commands to a PC. It's just one of the reasons speech recognition will likely remain a supplementary input technology instead of a replacement for the keyboard and mouse, at least in the foreseeable future.

Something to remember no matter what is that high accuracy rates sound good on paper but are frustrating in practice. Imagine we wrote this story using a speech recognition engine with a 98% accuracy rate. The story is approximately 2,400 words long, meaning the engine would, at best, cause 48 misspellings or grammatical errors. Even at 99% accuracy, there would be 24 errors spread throughout the article.

We checked after typing this article and found two spelling errors, both caused by computer industry terms that weren't incorporated into our custom dictionary. The moral? Definitely purchase a speech recognition product that works with a capable word processor that automatically detects mistakes.

The final low point of current speech recognition engines is their expense. Yes, there are some cheap products out there, but typically they are inferior to their counterparts that cost more than \$100. Prices will tumble as the technology achieves better market penetration, and the amount of competition that exists will also lower prices, but it will take time before the masses can afford an excellent speech recognition product and a good PC on which to run it.

■ What's Next. In the future, products capable of responding to speech commands will pop up in all sorts of places. Large-scale



myTalk is just one service that uses a combination of speech recognition and speech synthesis to serve customers.

else should opt for a new continuous recognition product.

Another aspect of speech recognition nearing extinction is training. Some current engines rely on a certain amount of training to learn a particular user's speech patterns. Many take the user through a one-time setup process, which takes 30 minutes to two hours, where users say a variety of words, numbers, and phrases. Most continually add to this user-specific database as the program is used, further refining the accuracy of the recognition. This means that most current engines improve over a period of weeks to achieve an ultimate level of 95% to 97% accuracy.

We have worked with products unable to translate even 70% of our input when first installed that increased to a 95% accuracy level after a month of use. Those improvement rates are incredible, but no real work



The introduction of Clarion's AutoPC heralded an age of advanced speech technology in products other than PCs.

translations from speech to text can already be accomplished using technology such as Dragon System's AudioMining. AudioMining is designed to search through enormous sound archives, such as recorded telephone calls or audio broadcasts, to find matches from a text search. The benefits for the law enforcement and legal communities are obvious, but it will also open new services for consumers. For example, vast archives of searchable music lyrics or television transcripts can easily be created with AudioMining technology.

The handheld market would enjoy some obvious benefits from incorporating speech recognition technology. Input is a persistent problem with these devices, so incorporating simple speech commands could greatly improve usability. One example of this type of device is Microsoft's development of the MiPad. It is envisioned as a handheld that combines traditional stylus input with the ability to understand simple spoken commands. It does not rely entirely on speech for input, so the amount of speech recognition it needs to perform is minimal. This means that products such as this could hit the market in the near future.

Big plans are in the works for security products based on speech. Human voices are theoretically as unique as fingerprints, which has led to a technique called voiceprinting used for identification purposes. In the future we may give a secret password to the front door that opens the deadbolt, saving us from having to fumble with our keys. Some critics are worried that users who come down with a cold may be denied access to their voiceprint-secured office, and there's no telling what future laryngitis victims will suffer through. There's also the problem that future sound technology will be so advanced that kindergartners will be able to use a handheld PC to emulate Dad's voice and gain access to the liquor cabinet. Apparently there are ways to overcome these limitations so that all sorts of

objects, including things as diverse as cars and guns, stand to benefit from the technology.

Instant language translation is another incredible ability speech engines will have in the future. It may be possible for an English-speaking customer to ask for technical assistance from a German-speaking customer service representative, with both parties speaking in their native tongues and the speech being routed through a real-time translation engine. Perhaps a Japanese Web-surfer could have the contents of an American Web page read aloud in Japanese, with practically no information lost in the translation. The possibilities are endless.

As processor speeds soar and data storage devices become more cavernous, it's possible that speech synthesis engines that rely on sounds recorded from real humans will become prevalent in the future. For example, it may be possible to have someone read thousands of common English words and record them digitally. An engine could be created that accesses the individual words and uses them to create sentences, adding pitch changes and punctuation where necessary to give the playback a more natural sound.

It's also likely that speech synthesis engines, combined with more powerful sound cards, will someday make synthesized speech indistinguishable from the real thing. It's possible that users will be able to choose certain voice types they want to use for the speech output, from a sultry Marilyn Monroe coo to the hair-raising exhortations of a drill instructor. Of course, as soon as that technology is perfected, you'll be reading about brain wave interception technology that lets users issue commands just by thinking about them. Regardless of what happens, it is unlikely that keyboards will be completely phased out in the future, but speech recognition should become more than the supplemental input technology it is today. **LE**

by Tracy Baker

Terms To Know

continuous speech recognition—This type of recognition engine lets users talk in a normal voice at a normal rate, with no awkward pauses between words.

discrete speech recognition—Older recognition engines require discrete speech, where users pause for a split second between each word. This method has a higher accuracy rate than the continuous speech method, but is clumsy in practice.

phoneme—Particles of speech, based on sounds as opposed to syllables. According to Microsoft, the English language has 64,000 phoneme variations.

speech recognition—This indicates that a program is capable of recognizing spoken input and converting it to another format, such as text or a different language.

speech synthesis—Sometime referred to as text-to-speech, speech synthesis is used to create a program capable of "speaking" output from text or other input. Frequently speech synthesis programs are included with speech recognition programs to create a suite of software that can handle any type of input.

voice recognition—Not to be confused with speech recognition, voice recognition programs are used to distinguish between individual speakers. This type of technology is used mainly in security software, but is good for several other things. Imagine a car, for example, that automatically adjusts the steering response, transmission shift points, and radio presets based on the preferences of the person in the driver's seat issuing spoken commands.

working vocabulary—The maximum number of words a speech engine can recognize or reproduce at any given time. Working vocabulary is akin to the color palette used by monitors, where a certain number of colors are available at any one time from a much larger total of possible colors.

Gadgets

Letting You Stay Connected As You Roam

In this age of ubiquitous computing, the way you access the Internet is slowly migrating off your desktop. You'll notice more portable devices, such as cellular phones, personal digital assistants (PDAs), and pagers, include micro-browsers that serve up Web content to fit on the smaller screens.

■ What's Hot. People want to make the Internet as easy to use as the telephone, so it's not surprising that a number of cell phone makers have taken the logical step of putting microbrowser technology inside their phones.

Leading portable-phone makers, such as Motorola (<http://www.motorola.com>), Nokia (<http://www.nokia.com>), NeoPoint (<http://www.neopoint.com>), and others are adding Internet support to their telephones, letting you view Web sites as well as send and receive e-mail over wireless networks.

This trend is a logical extension of the move away from analog cellular phones to digital and Personal Communication Service (PCS) digital services. Because first-generation cell phones were analog, a direct connection to the Internet wasn't possible. Instead, special cellular modems attached to separate notebook PCs allowed for wireless communications, an inconvenient and bulky solution. Today's integrated cell phone/Internet devices are no bigger than many typical phones but are far "smarter."

Currently, as befits the balkanized nature of the wireless market, most Internet-compatible phones must be used with a particular wireless Internet network, such as the Wireless Internet Protocol (Cellular Digital Packet Data; CDPD) network, Motorola's iDEN, Global System for

Mobile Communication (GSM), or others. However, an open standard called Wireless Access Protocol (WAP) has been introduced to allow compatible phones to surf on any wireless network. You should look for a WAP-compatible phone to be prepared for the future of wireless Internet, especially if you plan to roam outside your wireless provider's service area and still surf the Internet.

In the meantime, as with any wireless device, check coverage areas carefully and realize that, until WAP becomes commonplace, you buy the service, as well as the telephone. Make sure the service provider covers the areas you spend the most time in and compare rates, which may be determined by data transferred rather than airtime in the case of CDPD.

Whether you just want to listen to the Internet or talk back, pagers can now put you in touch with the Internet's e-mail capabilities. While a variety of one-way pagers lets users pick up Internet e-mail, two-way pagers with small keyboards are still rare. However, these devices are likely to become more popular as a way to enter brief replies.

If you travel frequently, consider using a two-way pager because this will let you make contact with your paging provider as you enter a new area and receive your pages in that area only, rather than having them broadcast throughout the paging company's service area.

Motorola is the current leader in two-way pagers, but the continuing trend away from one-way pagers should bring other players into the field.

If you're wondering about the benefits of receiving e-mail over your pager, see if your current paging company supports e-mail paging. Some vendors have form-enabled Web sites that let any user with a browser page its customers. Some of these services will automatically extract only the telephone number for numeric pagers but will pass the entire message to alphanumeric pagers.

The Palm organizers from 3Com are the most popular way for busy people to keep organized. Previously, to keep you connected these units required a trip back to the synchronizing cradle for a fresh dose of information. Now, you can add CDPD wireless Internet access to your Palm or to Windows CE powered handhelds and small notebook computers.

For Palm III-series units, Novatel Wireless's Minstrel III is a compact unit providing 19.2 kilobits per second (Kbps) full-duplex connection to the Internet. Novatel Wireless (<http://www.novatelwireless.com>) also offers the Sage external and Merlin PC Card internal wireless modems for use with Windows 95/98 (Win9x), NT, 2000, and CE. All three support the Wireless IP (CDPD v1.1) network, and provide support for standard Transmission Control



What's HOT

- Internet access through your cell phone
- E-mail on your pager
- Adding wireless Internet to existing units

What's NOT

- Windows CE-powered devices
- "Free" PCs for Internet access
- Analog-only cell phones

What's NEXT

- Dedicated Internet appliances
- Wireless Internet video
- Wireless Instant Messaging services

Protocol/Internet Protocol (TCP/IP) protocols such as Point-To-Point Protocol (PPP) and Serial Line Internet Protocol (SLIP) for dial-up access, and standard AT modem commands. Similar PC Card products are also available from Sierra Wireless (<http://www.sierrawireless.com>), makers of the AirCard series.

Instead of turning your phone into a Web browser, you can use it to connect your notebook computer with a Web browser to the Internet, using a cellular modem from companies, such as Xircom, Option International, and others to convert data before you transmit it to your ISP. These special modems use the MNPI0EC protocol to provide the best connection as you move from cell to cell and to prevent connection loss due to the handoff between cells. Because only a small part of the United States provides Wireless IP (CDPD) access, you may want to use this along with your notebook computer as a secondary access method for the Internet, using an ordinary dial-up account. This is especially useful if your dial-up account is with an ISP, such as CompuServe, which lets you use dial-up numbers across the country.

You can purchase low-cost modems dedicated to a particular brand of cellular phone, such as Option International's line of GSM-only modems for use with certain Ericsson or Nokia models or standard cellular-compatible modems that work with most analog or digital phones.

■ What's Not. Several vendors discontinued development of Windows CE-based systems during the fall of 1999, including Novatel Wireless, Everex, and Philips, while Sony announced it would support 3Com's Palm platform for future Internet devices instead of using Windows CE. Recent Microsoft announcements of collaborations with Sweden's Ericsson (for smart phones) and General Instruments (for TV set-top boxes using Microsoft Mobile Explorer technology) have no role for Windows CE. The former "Powered by Windows CE" phrase is becoming "powered by Windows."

The Windows CE operating system, which resembles Win95's user interface but uses non-Intel CPUs and a limited range of software from Microsoft and other vendors, isn't very popular in the subnotebook market, its original positioning. The Novatel Wireless CE-based CONTACT wireless system was replaced by the larger, ruggedized Viking line of wireless PCs running Win98.

Instead, Novatel Wireless also supports the other current flavors of Windows with its Sage external and Merlin PC Card wireless modems, which work with standard Win9x, NT and 2000, as well as CE.

Windows CE continues to show up in many small systems, including Palm-sized handheld units, but Microsoft's moves away from CE don't bode well for its long-term future. Since CE machines lack conventional storage, upgrades to the operating system come from the system vendors, and if they drop the product, your access to upgrades is gone.

One member of the "what's not" category initially sounded like a promising idea; however, a "free" or dramatically discounted PC (when you sign up for Internet access) has burned a lot of consumers. The idea was simple: sign a multi-year contract for Internet access and get a PC ready to surf the Internet for nothing or for \$400



Sierra Wireless's AirCard 300

off the normal price if you opted for a more powerful unit at a retail store. It resembled the Internet appliance trend highlighted below, but with a few important distinctions.

First, you had to sign up for a long-term deal in an era of short-term changes. The usual service contract on these deals is three years, but unless you live in a rural area, you're likely to have faster ways to access the Web before your three years are up. Because the coming high-speed Internet methods, such as cable modems, DirectPC, and Digital Subscriber Line (DSL) services don't come from the traditional ISPs offering the "free" or "almost free" PCs, you're locked into a long-term deal with penalties that could take every dollar of savings away if you bail out before the typical 36-month contract is over.

Second, a cheap PC is still a PC. You'll deal with mysterious crashes, dynamic link library (DLL) conflicts, illegal operations, and all of the problems inherent in a Windows-based PC. The

people most likely to grab one of these deals are also the least likely to want to learn a lot about the PC, so this is a big problem.

Third, you may be paying too much for Internet service. Many of the \$400 off computer deals require that you sign up for \$19.95 per month or higher monthly services. Other Internet services are available for \$14.95 to \$17.95. More and more advertising-supported services, such as NetZero and AltaVista, offer truly free Internet service, which lets you keep your old PC around for the Web or buy the PC you really want.

Fourth, some "free PC" vendors, such as Enchilada, have already gone out of business, and others, such as eMachines and Gobi, have had order backlogs or technical support woes.

Fifth, you may not be able to get the kind of PC you really want. Many of these deals revolve around low-end PCs that have limited features or require that you spend more money for upgrades if you can get them.

The bundling of hardware and software familiar to cell phone users may be acceptable for users who simply talk, but the Internet is more complicated.

If the idea of accessing e-mail or the Web with just your cell phone appeals to you, take a hard look at the phone in your hand. If it's a purely analog phone, you need a replacement. Analog phones represent the first phase of cellular wireless communications and still dominate many markets. However, because they are analog devices, they must be used along with a cellular modem and a PDA, handheld, or notebook PC for e-mail or Web access.

These phones are perfectly acceptable for voice use and make great security phones for families. Business users should look to multi-purpose digital/analog phones that support digital connections when available and drop back to analog connections when they are the only option available, as in many rural areas. These phones are easier and cheaper to bring to an Internet-ready state. If you are planning to keep your phone for several years, see which new phones will support the open Wireless Access Protocol (WAP) standard.

■ What's Next. By the middle of 2000, you'll have a choice of desktop solutions for accessing the Internet at home. Instead of shoving your spouse or child away from the computer to get the latest stock quotes or check out the latest Web freebie, you'll be able to walk over to a low-cost, no-brainer Internet



The circular disk on the right side of the keyboard is the pointing device on this Netpliance i-opener Internet appliance.

appliance. We're *not* talking about home appliances, such as refrigerators that order a fresh gallon of milk for you (at least, not yet!). Instead, these are single-purpose devices that surf the Internet.

You won't need to worry about arcane TCP/IP configurations or reloading new browser versions. Instead, just as you flip on a TV or throw a CD into your stereo, you'll turn on these units, equipped with a small keyboard and LCD screen, and start surfing or retrieve your e-mail.

These devices are divided into two categories: dedicated e-mail units, such as the forthcoming Simppliance eMailBox (<http://www.simppliance.com>), or e-mail plus Web-surfing units, such as the i-opener from startup Netpliance (<http://www.netpliance.com>) or iBrow from terminal and thin-client builder Boundless Technologies (<http://www.boundless.com>).

Web-surfing units, unlike the e-mail-only counterparts, are designed to support standard Hypertext Markup Language (HTML), graphic Web content, and e-mail. Beyond that, support for features such as streaming video and audio, Java, Secure Sockets Layer (SSL) secure shopping, and digital wallets varies by the device.

From the standpoint of easy home use, the telephone-coexistence features in the already-available i-opener from Netpliance are promising. The i-opener caches the latest e-mail and channel content, allowing off-line use. Pick up the phone, and i-opener automatically disconnects. Have an incoming call? i-opener shuts down to let you take the call. These telephone-friendly features promise to make i-opener work well in home settings, as will its notification of new e-mail, which it gathers automatically about four times a day.

Consider ease-of-use over feature bloat when you review these items, especially if you are looking for an e-mail-only device. All of these devices use the ubiquitous 56Kbps modem for dial-up access, but some also plan to offer a Universal Serial Bus (USB) port to allow faster connections in the future.

If you're searching for a moving reason to look at wireless communications, consider PacketVideo, a new San Diego-based company that has figured out how to stream decent-quality MPEG-4 (Motion Picture Experts Group) video data across the clunky 14.4Kbps connection used by most wireless Internet services. The secret is a special encoding method, which lets the same video stream be played back at any speed: PacketVideo intelligently drops frames as needed to optimize the connection at any speed.

If you have a CDPD-compatible wireless modem, you have the hardware to connect to a PacketVideo server. For CDMA or GSM phones, you'll also need a Socket Communications' Digital Phone Card and matching cable.

While some initial coverage of this technology has positioned it as a way to "watch TV while standing in line," Robert Tercek, president of PacketVideo, suggests a future world in which the combination of high-quality video, lightweight digital cameras and two-way wireless communications between devices using a short-range technology called Bluetooth can allow truly interactive media to be made by anyone.

In the meantime, though, you'll be able to watch trailers of Sony Pictures movies and soap operas on your PDA or notebook computer.

How important is instant messaging? Important enough that AOL and Microsoft spent most of 1999 fighting over access to AOL's millions of Instant Messenger users. The ability to send a real-time instant e-note to a friend or co-worker without fiddling around with normal e-mail systems is very important, and instant messaging is coming to the wireless world, as well.

AOL and Motorola are putting AOL Instant Messenger into Motorola's Smart Phones in early 2000, while Microsoft is supporting its competing MSN Messenger Service, which works along with Hotmail, to Windows CE and WebTV users.

As you do with AOL Instant Messenger, MSN Messenger, and others, you'll need to sign up with each instant messaging service you want to use because there's no sign the instant messaging wars will end anytime soon. [E]

by Mark Edward Soper

Terms To Know

Bluetooth—short-range, two-way wireless data standard that may be used by smart phones and computers to exchange information in the near future.

bundle—to include hardware and services or hardware and software in a purchase.

cable modem—high-speed Internet access device using the cable TV hookup.

Cellular Digital Packet Data (CDPD)—a technique for running digital data over an analog cellular connection; another name for wireless IP.

Digital Subscriber Line (DSL)—a faster way to access the Internet through ordinary phone lines.

Global System for Mobile Communications (GSM)—one of several digital telephone networks.

iDEN—a Motorola-developed digital telephone network available in Europe, Asia, and the United States.

Internet appliance—computer-like device used only for accessing the Web or reading e-mail; has a keyboard, screen, and pointing device, but uses random-access memory (RAM) for caching messages and data

Internet service provider (ISP)—company through which subscribers can access the Internet. ISPs can be chosen separately from hardware or may be bundled with hardware provided by Internet appliance or wireless Internet access companies.

smart phone—wireless phone with e-mail and Internet abilities and an LCD display.

Windows CE—one of Microsoft's Windows operating systems made for handheld, subnotebook, and palm-sized PCs.

wireless IP—See Cellular Digital Packet Data for more information.

Biometrics

Size & Price Refinements Make Some Technologies Consumer-Ready



The one thing 11-year old Nancy hates more than anything is when her brother, Josh, reads her diary and teases her about her most private thoughts. What's a girl to do when her teenage brother subjects her to such torment by invading her privacy?

Well, Nancy's problems may be at an end, thanks to her latest birthday present. Nancy's parents, recognizing the problem, went to eToys.com (<http://www.etoys.com>) and bought Nancy the Girl Tech Password Journal by Radica. This journal locks electronically and requires a spoken password to admit the proper user. By requiring a spoken password, Radica is implementing a primitive form of a biometric

technique known as voice verification into its journal.

Biometrics, a science long spoken about but slow to be implemented commercially, has silently but steadily crept into the lives of consumers. Perhaps not as exciting as the flamboyant methods used by James Bond, the real technology is nonetheless taking hold and influencing the way we live. To fully understand the impact, we must understand what we're talking about when we mention biometrics.

Biometrics consists of measurable physiological and/or behavioral

characteristics that can verify the identity of an individual. Included in these characteristics are fingerprints, hand geometry, iris and retinal prints, and voice. Biometrics represents unique identifiers of individuals that are not easily transferable to other individuals. Typically, a system takes three samples of a biometric feature such as a fingerprint, voice, or signature. It then averages the three samples to produce a template. Because the majority of available systems, for both the enterprise and the individual, are verification systems, the system verifies the user against its stored template for that person.

We live in a world where the password or numeric personal identification number (PIN)

has precedence. To enter your bank account from an ATM machine, you generally need to input a PIN after introducing your bankcard. At work, you may need a password to access your computer. Frequently, if you call the automated system at your credit card company, you'll need to input a password or PIN to gain access to and information from your accounts. More frequently, for identification purposes, we're asked for our social security number or mother's maiden name. All these precautions help to make certain that only the owner of the money, property, etc. gains access to it. Along with these precautions however, come problems.

People tend to forget passwords and PINs or mistype them. You may list your mother's maiden name correctly and be denied access because someone incorrectly entered the information into the system. Besides the obvious frustrations, glitches such as this can lead to delays and inconveniences that can be avoided by using different security techniques. Additionally, it is confusing to have multiple PINs and passwords for different bank and computer accounts, but it is also very risky to use the same PIN or password for all accounts. Based on all these things, the implementation and continual acceptance of biometrics seems logical and intelligent. Yet, not all technology or every device is accepted to the same degree.

■ **What's Hot.** Although biometrics relates to all parts of the body, some types of biometrics are presently more popular than others and are finding a broader acceptance in society. The three most popular types of biometrics are voice verification, fingerprint verification, and face geometry/facial recognition.

Voice verification. When Nancy says her password, a word she previously and secretly recorded into the electronic lock of her journal, she is using the journal's voice verification system. Voice verification is gaining in popularity worldwide, and yet most people are unaware of its presence.

Companies such as Charles Schwab and the Home Shopping Network have implemented

What's HOT

- Voice verification
- Fingerprint verification
- Face geometry/facial recognition

What's NOT

- Retinal scanning
- Iris scanning
- Ultrasonic fingerprint verification

What's NEXT

- Signature verification
- Hand geometry
- Two-finger geometry

voice recognition and voice verification systems to facilitate customers' transactions over the telephone. These, of course, are expensive enterprise systems too costly and cumbersome for the average consumer. Closer to home and to the average pocket book are some neat products that are readily available to the average consumer. For instance, Voicecrypt from Veritel (<http://www.veritelcorp.com>) is a voice-authentication product for Windows that protects files, directories, and applications on a computer. You can purchase it at most computer software stores for \$49.95 per unit. It does a good job of storing files in an encrypted partition or vault on the hard drive. This product also encodes file names of these encrypted files for added protection. Another product, SAFTyLatch from SAFLINK (<http://www.saflink.com>) has been flying off the shelves. For \$60, SAFTyLatch allows the user to establish a unique digital voiceprint that is used to allow access to files and to encrypt and scramble the files.

It's obvious from the popularity of these voice verification products that consumers at home and in the small-business arena are concerned about the security of their information and want to take the extra step to protect it. This doesn't mean they're paranoid or overcautious; it simply means that they recognize their personal data is valuable, and they need to protect it.

Fingerprint verification. Another popular biometric technique is finger scanning and fingerprint verification. Several methods of fingerprint verification exist, including matching minutiae, straight-pattern matching, and even elaborate ultrasonics for matching purposes. These are based on the fact that individuals have unique fingerprint characteristics. These characteristics consist of whorls, arches, loops, ridge endings, and ridge bifurcations.

All the present products permit a user to register his or her fingerprint (more than one is advisable). The fingerprints are retained in a database, and whenever the user wants access to the computer or a device, the system must compare his or her live fingerprints with the one(s) in the database. There are three types of finger scan devices, two of which are popular. The oldest technology is the optical scanner, where a finger is placed against a platen and a picture of the finger is captured. Presently, more than 50 vendors are making optical scanners. The second technology is a chip-based sensor, where users place their fingers onto silicon chips.

Perhaps the most popular consumer-oriented device is U.are.U by digitalPersona (<http://www.digitalpersona.com>). The inexpensive (less than \$100), sleek, mouselike device provides an additional layer of security. Easy to use, both for the enrollment process and for actual access, the average person can install and start using the device in just a few moments. If another device



SAFLINK SAFTyLatch

is distasteful to a user, KeyTronic (<http://www.keytronic.com>) produces a very ergonomic keyboard that has the fingerprint reader built in to the unit. Only slightly larger than the regular keyboard, it takes no special skills to plug it in, install the software, and register users' fingerprints. Geared to the consumer but equally popular in the corporate environment, the keyboard is within the average consumer's budget. Because many individuals can enroll using the same system, this type of biometric technology is ideal for instances where several users need to share a computer.

Face geometry/facial recognition. Even though voice verification and fingerprint verification are the hottest of the biometric technologies to catch on, several other methods are also gaining popularity. Among these techniques is facial recognition. Using a camera, an image of a face is made from a few feet. The system then analyzes the geometry of the face, for instance, the distance between the eyes. Generally, via a face locating function, the system searches for faces within the field of view. These systems store a database of photographs and then compare a live on-camera image of an individual to the stored photograph. Designed to compensate for beards, hats, and glasses, these systems can perform verification and identification. After being tested at banks in Texas, either replacing bankcards for ATMs or replacing the PINs for ATMs, smaller, more economical systems were

marketed to the small-office environment. Additionally, some of the gated communities and maximum-security high rises now use the smaller systems to identify their residents. The most prominent and affordable of these systems are TrueFace Network from Miros (<http://www.miros.com>; \$39 to \$99 per seat) and Facelt NT from Visionics (<http://www.visionics.com>; \$99 per seat).

What's Not. The least popular types of biometrics in society today are retinal scanning, iris scanning, and ultrasonic fingerprint verification. Although many government and restricted corporate facilities use these, they have not become popular in everyday life. To understand their lack of popularity we have to understand what they are and what they do.

Retinal scanning and iris scanning. Even though we've all seen it in popular spy movies, individual consumers in the private sector do not often use retinal scanning and iris

scanning. Retinal scanning requires a user to look into a device so a low-intensity light source can scan the unique patterns of the retina; this is an expensive and intrusive technology. Most private consumers simply don't need this specific technology.

Iris scanning, the less intrusive of the two methods doesn't require any intimate contact between the reader and the user. There are two separate applications. Passive-iris scan incorporates cameras that automatically locate the user's face and eyes. Active-iris scan requires considerable adjustment of the camera to bring the iris into focus, and that requires instruction and supervision. Demonstrated to work with glasses in place and with different ethnic groups, this technology is still too expensive for the average consumer, and it is generally unnecessary. However, it is becoming more popular in the corporate sector for access control of employees and visitors and for identity verification of banking customers. An important thing to note, though, is that iris scan is presently the most expensive biometric technology in existence, requiring many thousands of dollars to implement and maintain.

Ultrasonic fingerprint verification. Ultra-sound technology, the third and least popular form of fingerprint verification, has also been around for many years. When the finger is on the platen, a user will hear a buzzing and feel a vibration as the unit is taking the ultrasonic

scan. Because of the use of sound, direct contact with the platen is not necessary. Perhaps because of the buzzing sound and vibrations, or perhaps because other types of fingerprint verification are so popular and widely used, ultrasonic fingerprint verification is simply not a trendy biometric method.

■ **What's Next.** Even with all the biometric techniques and methods we've discussed, there are additional types of biometrics under development that appear to be poised for broader growth.

Signature verification. Another interesting technology that is gaining momentum is signature verification. Cyber-SIGN (<http://www.cybersign.com>) has a product consisting of a tablet by Wacom and a wireless pen. Once a signature is in the database, new signatures are compared to it. Presently, there haven't been many individual-consumer oriented uses. Originally developed for artists to use for drawing and designing, the technology carries over well to larger applications such as signing into an enterprise system, signing documents, or signing for the removal of materials. Recently, Cyber-SIGN has moved into the medical field with physicians using the system to sign and authenticate prescriptions and medical records. Another signature-verification device is the LCI SMARTpen Biometric Authentication System (<http://www.smartpen.net>). A wireless minicomputer that writes as a typical ballpoint pen. While the user is signing, the pen's sensors register the speed, pressure, and angles (also known as dynamics) of the act of signing. The dynamics are strictly personal for each individual. Even though there are many possible applications for signature verification, there is still a lot of growth needed before we could classify this as a hot technology, especially in the private sector.

Hand and two-finger geometry. Another technology that hasn't grown as quickly as anticipated is hand geometry. This method involves measuring the physical characteristics of the users' hand and fingers. To use this technology, the user places his or her hand on a platen and lines it up with five

guide pegs. After taking a picture of the hand, the system examines 90 characteristics, including the three-dimensional shape of the hand, the length and width of the hand, and the shape of the knuckles. This type of technology is used for physical access and time and attendance at various enterprise locations, including banks, university dormitories, day care centers, and other business environments. A modified form of hand geometry is two-finger geometry, where the system examines only the shape and form of two fingers. Disney World has adopted two-finger geometry to verify season-ticket holders. Even though hand geometry is becoming increasingly popular in large-scale corporate environments, it hasn't really caught on in the private area. This could be because although hand geometry devices are generally easy to use, there are few applications for the individual.

Increasing adoption. Consistently, we see the adoption of more biometric technology into our lives, whether we are aware of it or not. Many states are adopting the finger scan and fingerprint verification technology to identify drivers and stop individuals from swapping licenses or using counterfeit licenses. Universities are implementing hand geometry and facial recognition systems to secure dormitories and stop the abuse of certain university systems. Some states have adopted the finger scan method to stop the abuse of the welfare system and related paid benefits. Hospitals and day care centers have been implementing both finger scan and facial recognition systems to prevent unauthorized individuals from entering and harming children. Some states are adopting biometrics to stop fraudulent voting during elections. Under discussion are uses for traveling into

and out of countries, working in high-risk facilities, preventing theft from unauthorized individuals, verifying Internet transactions, and verifying telephone transactions and calling participants. [E]

by Diane E. Levine

Terms To Know

biometrics—Using measurable physiological and/or behavioral characteristics to verify the identity of an individual. This technology is replacing passwords and PINs.

face geometry/face recognition—A system analysis of the geometry of the face and verification of an individual's identity by comparing it with a live sample.

fingerprint verification—Scanning the finger and comparing distinct physiological traits in the print to a live sample for identity verification.

hand geometry—Examining and using approximately 90 characteristics of the human hand to verify the identity of an individual.

iris scanning—Using a camera to scan an individual eye iris for comparison and identity verification purposes.

password—A set of secret characters needed to gain access to a computer or to files and programs within the system.

retinal scanning—Scanning an individual's retina with a low-intensity light source and comparing the image to a stored template.

signature verification—Comparison of a signature sample's pressure and structure against a stored template for identity verification purposes.

two-finger geometry—A modified form of hand geometry that uses the features of only two fingers to verify an individual's identity.

ultrasonic fingerprint verification—The use of ultrasonic waves to create a template of an individual's finger(s) for identity verification.

voice verification—Using the unique pattern of an individual's voice to verify the individual's identity



digitalPersona U.are.U

Networking

Cable & DSL Bring More Internet Connection Sharing

In today's world of computer networking, the area that is showing the hottest technological advancements is, of course, the Internet. New connection mediums, such as cable modems and Digital Subscriber Lines (DSL), are enabling users to get online faster and surf like never before. As with Internet connections, computer network speeds are also speeding up with Gigabit Ethernet, another hot new technology that is paving the way for other new advancements in networking.

■ What's Hot. To get you caught up on the latest happenings in the world of networking, we'll look at some of the newest networking technologies.

High-speed connection mediums. Connecting to the Internet via cable or DSL are the hottest things going in the Small Office/Home Office (SOHO) networking arena. Whether you are connecting to the Internet from home or from the office, kiss your modem goodbye! These new technologies offer up to 50 times the throughput capability of traditional dial-up modems. This makes the Web a practical place to conduct business and find information.

Cable modems offer a theoretical throughput (data transmitted) of 10 megabits per second (Mbps), but most users will typically see between 500 kilobits per second (Kbps) and 2Mbps of downstream throughput.



(Downstream throughput is the rate at which a computer receives information from the Internet.) Cable modems operate asymmetrically, meaning users get different upstream and downstream capabilities. Most cable modem services offer 128Kbps of upstream capability with options to purchase up to 512Kbps. Unlike their 33.6Kbps and 56Kbps analog counterparts, cable modems do not need to "dial" your Internet service provider (ISP); a cable modem is always online, even with the computer off.

Telephone companies also have a hot new product for connecting to the Internet called DSL. This service uses the existing copper telephone lines to provide high-speed access to homes and offices. It does this by running the service at different frequencies than voice. There are many types of DSL services, so users need to contact their local telephone provider to see what services they can obtain. Depending on the type of DSL service available, you can achieve speeds of up to 1.5Mbps of downstream throughput. Like cable modems, the connection is asymmetrical and has a lower upstream capability.

High-speed Internet connection sharing. With the coming of affordable high-speed

Internet connections, such as cable and DSL, also comes the means to share the connection with multiple computers without additional monthly charges. New routers designed to work with these two forms of broadband Internet access have emerged. These routers come with a Dynamic Host Configuration Protocol (DHCP)

server, which allows the routers to assign Transmission Control Protocol /Internet Protocol (TCP /IP) addresses to users on the local-area network (LAN). The routers also implement Network Address Translation (NAT), which is a method of tracking which users on the LAN made the request to the

Internet so the return traffic/data makes it back to them. NAT provides a level of security to the LAN by logically separating the LAN from the Internet. For more information on these new routers, check with these manufacturers: ZyXEL (<http://www.zyxel.com>), Efficient Networks (<http://www.efficient.com>), and Netopia (<http://www.netopia.com>).

Thin-client computing. Thin-client computing is a hot new idea based on an older technology that has almost been replaced by PCs. Thin-client computing allows a central computer to do all the processing for its client computers, much like a mainframe does. PCs changed this by allowing the client computers (PCs) to do all of their own processing while sharing files in a central location. For a computer network to be able to operate at optimum levels, companies must purchase new client computers every few years to get the greatest processing power possible to the desktop.

In the thin-client computer model, client computers can be either PCs running client software or semidumb terminals. The client computers don't need to be powerful at all because they are not the machines on the

What's HOT

- High-speed connections (Cable modems and DSL)
- Thin-client computing
- Virtual Private Networks (VPNs)

What's NOT

- 10 megabit Ethernet
- Cellular modems
- Analog modems

What's NEXT

- Satellite communications
- Wireless communications technology
- Computing facilities

network doing the processing. They need to be able to send requests to the server, display results, print, and play sounds, if necessary.

This also simplifies upgrading hardware and software. To increase the processing power of the network, the only hardware that requires upgrading is the server. You can also install software on the server and deploy it to users with minimal effort. This is because you do not need to install the software on every client computer on the network; you only need to install it on the server.

Microsoft (<http://www.microsoft.com>) and Citrix (<http://www.citrix.com>) are the two major players in thin-client computing. Microsoft has Windows Terminal Server, which is based on the Windows NT Server operating system. It allows computers running Windows 9.X and Windows NT to connect to a virtual Windows NT session on the Terminal Server. Citrix's MetaFrame runs on top of Windows NT terminal server and adds some additional functionality, such as the ability to handle connections from Macintosh clients, Unix clients, DOS, and Windows 3.1.

Voice over IP solutions. TCP/IP is capable of allowing users to explore the Web. It is also capable of supporting voice communications. You can accomplish voice over IP (VoIP) using several software and hardware solutions.

On the Internet, users can place calls to one another using their soundcards, microphones, and any number of software packages such as NetMeeting and IP Phone. The only catch here is that both parties involved in the phone call must be online at the same time. [dialpad](http://www.dialpad.com) (<http://www.dialpad.com>) is a Web site that allows users to place real phone calls to people anywhere inside the continental United States from their Web site for free. The only user requirements are a microphone, a pair of speakers, and an Internet connection.

Hardware boxes designed to replace phone systems are also making their way into modern computer networks. These devices allow users to make voice calls over a LAN, wide-area network (WAN), and the Internet by sending voice over the IP protocol. Like all new technologies, these Phone Data Exchanges (PDXs) are still out of the price range of most users. As prices drop, though, they are going to become a threat to conventional digital and

analog phone systems. You can configure them to support all the features, such as voice mail, call transferring, and call restrictions, found in retail phone systems.

Cable companies are also going to be entering the telecommunications market by providing homes with dial tone. This means they will be able to compete with telephone companies for business.



ZyXEL Prestige 128L router

Gigabit Ethernet. Every couple of years, something in computer networking comes along and changes everything. The speeds of computer networks have come a long way from 10Mbps to 100Mbps. Today's buzzword is Gigabit Ethernet. This new standard allows computers on a LAN to communicate at 1,000Mbps. The Gigabit specification allows for computer networks running unshielded twisted-pair Category 5 (UTP Cat 5) cable to achieve Gigabit performance using their existing cable. Of course, new technology comes with a price tag. Gigabit hubs and Ethernet cards can cost up to 10 times more than comparable 100Mbps components. The price tag puts this technology out of the reach of most home and SOHO users, but it won't be long before lower prices put it within everyone's reach. This is a hot new technology that will lead the way for more advancements in LANs, including VoIP, teleconferencing, and thin-client computing.

VPNs. With the new Internet connection mediums and increased bandwidth, Virtual Private Networks (VPNs) are a great way for users at home or on the road to connect to an office LAN that has a full-time Internet connection. VPNs are making it possible for users to telecommute (work from home via a PC). By using a VPN connection, remote users become a node on the office LAN. They can retrieve data, send e-mail, and even take remote control of an office computer. By remotely controlling an

office computer, remote users can run all their normal applications and maximize the bandwidth of the connection by sending only keystrokes and video across the connection.

■ **What's Not.** With all these new technologies appearing on the market, there are also a few dropping out. Don't expect to see technologies such as cellular modems, analog modems, and 10 megabit (Mb) Ethernet around for too much longer.

10Mb and USB networking. Ten years ago, 10Mbps Ethernet networking was the future in network cabling speeds. Now with 100Mbps Ethernet equipment costing about the same as 10Mbps equipment, it is not worth spending the money on 10Mbps network interface cards (NICs) and hubs for 1/10th of the throughput. Even though there are still users with 10Mbps equipment on their LANs, these users should

not put any more money into that equipment. Hubs are available today that allow users to mix and match their networking equipment. Auto-sensing hubs automatically detect what type of network adapter they are attached to (either 10Mbps or 100Mbps), and they allow the computers to make a connection to the network. If users have a 10Mbps network, it is a good idea to invest in one of these hubs and gradually replace 10Mbps NICs with ones capable of running at 100Mbps.

Universal Serial Bus (USB) network adapters have not quite made it in the demanding world of computer networks. Even though they are easy to install and use, they don't have what it takes to keep up with the demand of the users. Modern computer networks are commonly built around 100Mbps Ethernet. USB is not capable of 10Mbps throughput, even though it is marketed as such. USB technology is only theoretically capable of sending and receiving information at about 8Mbps. Even though they are extremely easy to install and use, home and SOHO users are better off putting their money into some 100Mbps Ethernet equipment.

Cellular networking/Internet. Accessing the Internet or a computer network from a cellular connection is for the most part wishful thinking. A few years ago, everyone was excited about being able to access the Internet from their laptop computers by using cellular-modem connections. Cellular-modem

technology has not caught on very well at all—and for good reasons.

Cellular modems need to put up with much more interference than analog modems do, and cellular networks are not designed with data in mind. They handle voice calls, which require much less bandwidth to maintain voice quality than data. Cellular technology offers from about 4.8Kbps to 19.2Kbps data connections. This is not enough bandwidth to maintain any real Internet surfing, but it does allow sufficient bandwidth for sending and receiving simple e-mail messages as long as you don't try to send large attachments.

Analog modems. Even though dial-up connections to the Internet are still the primary way users get online and connect to the office, analog modems are a dying technology. Analog-modem connections to the Web do not provide users with the bandwidth they need to make the Web a pleasant place to go for information. Users have to wait way too long to retrieve information in the form of images and multimedia presentations on the Web. These modems force users to deal with frequent disconnections, and you can almost forget trying to videoconference with friends and co-workers. With new high-speed Internet access becoming more affordable (in some cases cheaper than a phone line and ISP account), analog modems won't last long for remote network and Internet access.

■ **What's Next.** New networking technologies are also underway, but they may take a few years to hit the market. Technologies such as satellite-based and wireless-based Internet capability will change the way we perceive and use the Internet, as well as lay the groundwork for the development of other hot new technologies. One day our computers

may be nothing more than terminals served by a community computing facility.

Satellite communications. Even though modern Internet connection technologies promise to make the Web a practical place to work, the technology of tomorrow will offer ultra-high-speed Internet access to the entire world. Teledesic (<http://www.teledesic.com>), the company designing a satellite communications infrastructure, will be able to deliver high-speed Internet access to every location on the globe. It will pave the way for new advancements to the Internet such as real-time videoconferencing and high-quality voice. The satellite system will also make it more practical to connect individual LANs together that are geographically spread out. The Teledesic network should launch sometime in 2004.

Wireless modems. Also by the year 2004, it will be possible to access the Internet through new wireless technology. This new technology is promising speeds reaching up to 384Kbps. This technology, like the Teledesic Network, will bring about other great Internet technologies because of its huge throughput capability. It is very likely this technology will work with the Teledesic network. Ground stations, such as ISPs, can have satellite access and use this wireless technology to reach users in its coverage area. Users of this service will be required to have some sort of receiver, which will probably resemble an antenna similar to that of current television antennas.

Central computer facilities. Even though it might be some time before we see it, the coming of tremendous bandwidth availability will eventually lead to great new services. Based on the thin-client model described above, users could potentially buy a computer terminal that wouldn't require upgrading. Users could use terminals with their connection medium to connect to a local computer facility, which would provide them with their operating system, program files, and data. Users would end up paying this facility to keep all the user's information, programs, and processing power. Instead of upgrading computers as we do today, the computer facility would be the only one doing the upgrading at its main computer center. The facility could charge for extra services, which will probably come in the form of additional software packages and storage space. [E]

by Scott Jones

Terms To Know

analog—Refers to an electronic device that uses a system of unlimited variables to measure or represent the flow of data. Radios, for example, are analog because they use variable sound waves to carry the data from the transmitter to the receiver.

bandwidth—The capacity a network or data connection has for carrying data. For analog transmission, bandwidth is the difference between the upper and lower transmission frequencies in a given range. It is measured in cycles per second or hertz (Hz). For digital transmission, bandwidth is measured in bits per second (bps); the larger the bandwidth number, the faster the digital transmission.

Digital Subscriber Line (DSL)—A technology that allows for high-speed data communications over existing, copper phone lines. DSL can provide connections to the Internet or local-area networks (LANs) and can be used for videoconferencing.

router—A piece of hardware used to tie networks together. A router is part of a communications network that receives transmissions (information) and forwards them to their destinations using the shortest route available.

thin client—A computer or hardware device that relies on another computer for its processing power.

Transmission Control Protocol/Internet Protocol (TCP/IP)—This is the communication protocol (language) that empowers the Internet.

Virtual Private Network (VPN)—This technology allows users to connect to office networks over the Internet. This is a private network implemented throughout or within a public network.

voice over IP (VoIP)—A technology allowing voice communications to be conducted over the Transmission Control Protocol/Internet Protocol (TCP/IP).



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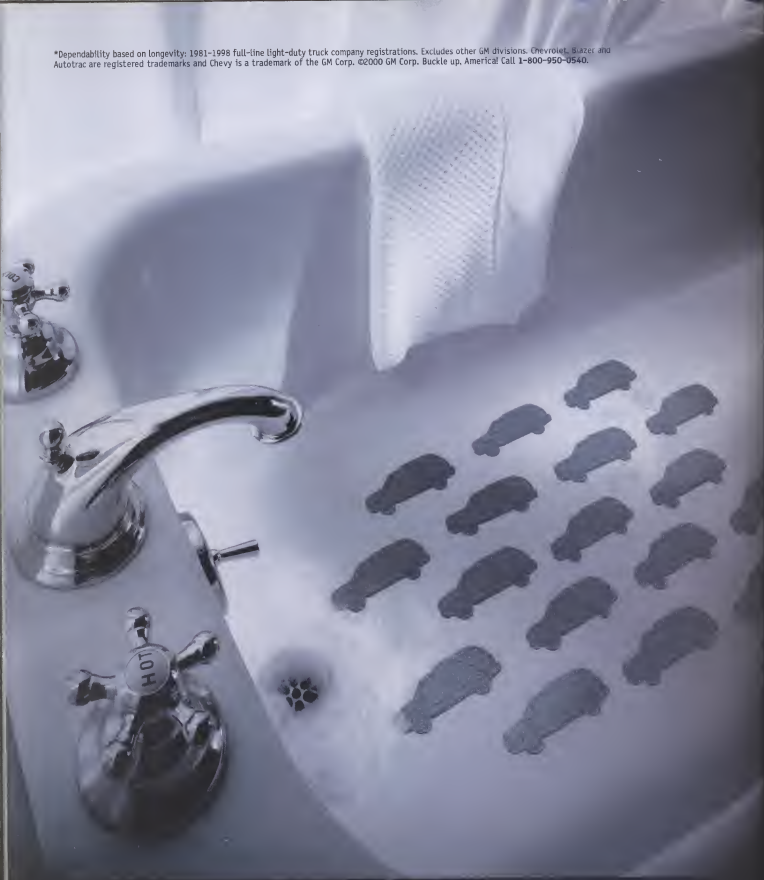
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